GAS JOURNAL

LIGHT ⁘ HEAT ⁘ POWER ⁘ BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

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VOL. CLXXXIII. No. 3407.] WEDNESDAY, SEPTEMBER 5, 1928. [80TH YEAR.

Editorial Notes.

Maintenance.

OF late little has been heard of the inspection and maintenance of consumers' appliances; and it is opportune, now that the holiday season is drawing to its close and the days are rapidly shortening, once more to focus attention upon that all-important subject. The seed of maintenance was sown many years ago; but not till after the war did zealous missionary work and a few pious examples in practice spread abroad realization of the need for organized "service." In their crusade, the early devotees were helped by the war's legacy of neglected and decrepit apparatus, and by the conviction that "a cheap and abundant supply" of electricity was to be the *panache* of any political party that stayed long enough in power to interfere with that commodity's normal development. Thus the maintenance movement quickly gathered strength, and culminated in the noteworthy conference convened in February, 1927, by The Institution of Gas Engineers and the British Commercial Gas Association. That Conference was remarkable not least for its broadly representative nature, for all sizes of gas undertaking had sent delegates, and engineer and committee chairman alike took part in the discussions. The outcome was the unanimous resolution—

> That an efficient system of periodical inspection and maintenance of the gas appliances in all consumers' premises (backed by a constant supply of gas adequate to meet the maximum demand) is essential to the permanent prosperity and future progress of the gas industry, and to the complete fulfilment of its duties to the community; and that to this end every possible facility and encouragement should be given for the education and training of the personnel necessary for carrying out the work entailed.

The Conference then turned its attention to the rather more contentious question of how the cost of periodical inspection and maintenance should be recouped—whether by direct charge to such consumers as contracted for the work, by an increase in the price of gas, or by an adjustment of rentals. Here, however, so many considerations are involved and conditions vary so widely, that the question could not be answered by a single formula; and the sense of the meeting was that each undertaking, with the great idea before it, should itself determine the means of approach.

For ourselves, we can claim never to have lost an opportunity of urging upon our readers the essential need of this "complete fulfilment of duties to the community;" and we make no apology for returning to the subject on this occasion. For some months after the Conference, inspection and maintenance received fairly close attention at the meetings of District Associations and Salesmen's Circles, and at the 1927 meeting of The Institution of Gas Engineers the literature of the subject was enriched by Mr. T. F. Canning's paper. But since then—and the columns of the "JOURNAL" reflect most of the doings of the gas industry—references to this acknowledged *sine qua non* of progress are notable by their paucity. Why is this? If the policy of inspection and maintenance is steadily progressing in adoption, then we would suggest that the undertakings concerned should pass on to the industry in general some account of how they have solved the difficulties and applied the principle in their special circumstances. If, on the other hand, the absence of news means that interest in the subject has passed its zenith, then all possible steps must be taken to restore it to the peak. Perhaps the difficulty of providing staff of the right type for home inspection and service is delaying the adoption of schemes, and in due course we shall hear that men have at last been trained and sent out on the job. Maybe the work of preliminary inspection and census is not yet complete. Possibly many efforts have been made, but come to naught owing to the apathy of the gas consuming public. Whatever the reason for this apparent fading of zeal (and may appearances in this case preserve their reputation for deception!) no harm can be done by again ventilating the subject. Our one hope is that the Maintenance Conference was not packed only with enthusiasts—that the preaching was not only to the converted. Undoubtedly, great difficulties present themselves to the officers of small and medium-sized undertakings; and in the larger ones it may not be easy to compose the differences of opinion and decide upon what line a scheme shall be devised. But the forcefulness of that unanimous resolution at the Maintenance Conference should be sufficient to bring every undertaking face to face with its responsibility in this regard.

Bulwark of the Lighting Load.

AT this time of year the gas engineer is again looking forward to the upward curve of his lighting load, and the manufacturer of lighting appliances is telling the industry about the season's improvements and novelties; and as the catalogues are perused, it were well that the reader's thoughts should turn, not so much to the possibilities of grand new installations, as to the repair and substitution of old and inefficient ones. The unsteady gas fire or the grease-laden cooker ring will not steal goodwill and jeopardize business to the same extent as will the broken mantle and the noisy lighting burner which the owner, even supposing he has (which is unlikely) the best intentions and the necessary knowledge, cannot adjust because the regulating means is firmly fixed in position with the scale of years. The majority of maintenance schemes which have come to our notice include provision for the replacement of shoddy lighting fittings on the most favourable terms; and in some cases undertakings have found it policy to instal free of cost to the consumer one or two burners of up-to-date design. Here and there we hear the complaint made—sometimes with concern, but more often with a resigned shrug of the shoulders—that the lighting load is slipping away; but we venture to assert that if the complainant had inwardly digested and

outwardly put to proof the recommendation of the Maintenance Conference (as set out above), he would not only have retained, but would have added to, the former peak of his lighting. Without constancy of the gas supply and inspection and maintenance of appliances, the other branches of gas service will struggle along an uninspired road, but the lighting will assuredly slip back, and in so doing prejudice the stability of the rest.

Let no man in our industry shrug his shoulders over the lighting load. As great advances have been made in the design of gas lighting appliances as in electrical; every year the ingenuity of the manufacturers finds some improvement in working or control. The well-proportioned gas pendant is a far handsomer fitting than the flex-supported globe of the electricians; and when it comes to the more expensive bowl fitting, which the advance in glass technology has made available to gas, we lose nothing from the æsthetic aspect. The old claim that gas gives the gentler and healthier light, even if the pocket of the rival consumer allows him to screen-off a large proportion of the electric light, still holds good; and if pockets are short, more potent arguments are at hand. Last week the Electric Lighting Manufacturers' Association announced a reduced scale of charges for lamps; and the lowest-rated are now obtainable for 2s. But we still maintain that the working-class household cannot afford that doubtful luxury, which in times of hardship we can see being carried from room to room. The artisan will be well advised to spend his two shillings on four gas mantles, which will last him longer and give him greater comfort.

Co-Ordination of Research.

IT is a big task that has been undertaken by the Committee on Co-ordination of Scientific and Marketing Research (under the chairmanship of Mr. H. C. Abell), which has been appointed by the American Gas Association. The work, however, is of the utmost importance. The need and the desire for research grow greater with the passage of time; and with this growth there is increasing necessity to ensure that active support is given to those lines of research that are likely to justify most completely the time and money required to carry them through. Under existing conditions, the Association are often requested to find funds for some research activity which it is evident is excellent in itself, but which might conceivably not be the most important for the industry to undertake at the moment; and it is frequently possible that work is in progress in some quarter bearing in view the same object, which will result in duplication should it be started-on also by the Association. To ensure that neither of these things happens is one part of the Committee's work; but they are further expected to look into the future, and formulate plans for making the Association an active partner in every piece of research undertaken by their members directly or through educational institutions. The Committee found it easy to obtain information concerning research activities under the auspices of affiliated associations, mostly educational institutions throughout the country. Some of the gas companies also outlined briefly their existing schemes along this line. It was not, however, possible to secure an appreciable amount of information from manufacturers, who for the most part were unwilling to divulge the projects they had under way.

Work of the first magnitude is being carried out at the present time by the American Gas Association in their own laboratory; and of all the existing research activities the Committee express their hearty approval. But in addition to this they have sought from their own members and from various sources suggestions as to other lines of research which the Association can well undertake; and in a report lately issued by Mr. Abell, some of these suggested researches are set out. Glancing down this list, one is struck alike by the vast quantity of work that lies before the laboratory of the American Gas Association, and by the great amount of good to the gas industry in general that will in all probability result from this work. The Association are assured in their labours of the good wishes of their colleagues on this side.

Business Principles.

ONE evening's issue of a popular daily newspaper last week contained two statements of importance which invited reflection. The first of these was to the effect that preliminary figures of the traffic receipts of the English railways for the previous week, when the cheap week-end fares came into operation, did not indicate any recovery in the gross revenues of the companies. Each of the four big-group companies recorded a decrease in its receipts as compared with the corresponding week of 1927. The position in which our railway companies find themselves must be the subject of general regret; for we are all of us more or less dependent upon them—if not directly, then at any rate indirectly. Even if, in many cases, it should be found a more tempting proposition to ship commodities direct from London to Glasgow (a journey occupying between three and four days), or from Newcastle to London, there still remain innumerable other directions in which carriage by rail takes precedence of any other means of conveyance. The gas industry in general, consequent upon the great bulk of its raw material supplies and of its disposable residual products, is peculiarly dependent upon the "iron road;" and thus it is that we feel a close interest in the welfare of the railway companies. It is because we wish them well—call it a selfish wish, if you like; it is based on self-interest—that we should so heartily welcome some much bolder step for the reinstating of their fortunes than the inauguration of cheap week-end fares.

The great industries are dependent upon the railways, and it is equally true to say that the railways are dependent upon the industries. Cheap week-end fares on their initiation have proved a failure. Were they to be a success, it could only be by encouraging people who would not otherwise do so to make journeys which are unnecessary. In other words, it would be by the aid of what might be termed—at least in one sense of the phrase—"luxury travel," at a time when we are being exhorted from various quarters to exercise all practicable economy, to the end that the country may be re-established in the position it once occupied in relation to the other nations of the world. What we should like to see would be concessions which would aid business by inducing people to use the railways in going to and from their work (in preference to another longer and perhaps more tedious, but—all-important consideration—cheaper, means of transport), as well as concessions which would place our industries in a better position to meet their competitors. We appeal to the railway companies for some bold scheme by which they may at one stroke help both themselves and those dependent upon them. There still remain other directions in which to strike-out. Cheap week-end fares apparently offer no prospect of salvation; while increases in charges would seem to have had little better result. What will the railway companies now do to secure that increase of remunerative business which is so essential to them and to the country as a whole?

Cause and Effect.

SPEAKING of the increases in charges which the railway companies have of late years deemed it necessary to impose, brings us to the second statement to which allusion was made in the opening sentence of the above article. This statement was to the effect that women's varying tastes and changing fashions, which had already shattered the fortunes of the woollen industry, had now brought about a crisis in the world cocoa and chocolate trade. In explanation of this position of affairs, it was added that, as a result of the heavy decrease in the demand for chocolates, and the narrow margin of profit, the British cocoa pool had now been broken up. Whether or not such a crisis has arisen, and whether or not the dissolving of the cocoa pool will prove disadvantageous to the participants, it is not our purpose here to inquire. The portion of the statement which gave rise to reflection was that which ascribed the reasons for the state of affairs pictured by our contemporary. The reasons advanced were that women were buying more cigarettes and fewer chocolates; and that along with this growth of cigarette

smoking among women, there is a fashion which has stopped even those who do not smoke from eating chocolates. Doubtless these might be causes of such an effect as is described; but would they be the only causes?

There is another possible cause which, to our mind, should have been bracketed with the two named above, if not even placed before them. From whatever reason it may arise, a high price is a cause which must ultimately have its effect. A high price may be perfectly well justified, its imposition may be absolutely unavoidable, but nevertheless its effect is certain. There is no time-limit within which effect will follow cause. It may be sooner, it may be later; but follow it will, in due season. It is only the very young who cannot recall the time when there sprang up like mushrooms in a night numberless chocolate shops whose windows displayed goods marked at high prices. However necessary these prices may have been at the time—and we are saying nothing against them, though the business became so popular that it is fair to assume there was a tempting temporary profit—they must inevitably have deterred multitudes from a purchase. So that we have with us now—as the effect of this—what is to some extent a non-chocolate eating generation. In laying down one's business principles, it must always be remembered that a high price, justifiable or unjustifiable, will, sooner or later, have its effect, as inevitably as that night follows day. This does not apply solely to any one particular thing, but to all industries alike.

Advantages of Combines.

Writing on the subject of industrial amalgamations in the columns of the "Financial Times," the Right Hon. Philip Snowden, M.P., ex-Chancellor of the Exchequer, remarks that there is a disposition in many quarters to look with disapproval upon the rapid movement towards these combinations. He, however, sees that this movement towards amalgamation of capital is irresistible. It is the inevitable development of the joint-stock system, the rise of which Mr. Snowden says was due to the fact that modern methods of production and transport increasingly necessitated the concentration of capital in large units, and in ever-increasing units, because the amount of capital requisite to take full advantage of, and to utilize the possibilities of, mechanical and scientific development was such as, generally speaking, to be quite beyond the resources of an individual capitalist. It was necessary, therefore, if these advantages were to be fully and economically exploited, that there should be a combination of individual capitals, making a very large unit in the aggregate. Organized labour, it appears, is at present rather bewildered, and is not quite sure whether it ought to welcome or denounce the movement. If the tendency is irresistible, there is an end to the matter. All the advantages foreseen may be reaped; but we shall still regret the inevitable loss of much of the personal touch in business that exists in circumstances of individual control.

The Coking Industry in Japan.

An interesting communication on this subject, from the pen of Tadaji Shimmura, was published in a recent issue of "Fuel in Science and Practice." The coal used in Japan and South Manchuria for making blast-furnace coke amounts to about 1,800,000 tons per year, and for making foundry coke to 500,000 tons; the total corresponding to 9 p.ct. of the coal consumption in Japan. Semet-Solvay and Koppers ovens are largely employed, but ovens of the Kuroda (Japanese) type are most common. Six plants utilize their surplus gas for town supply, five employ it for tar distilling, three for steel furnace firing, three for industrial drying purposes, and one in a gas engine. It is mentioned in the article that most of the Japanese coking coals have a high volatile content and produce a fingery coke when carbonized alone. To produce a compact coke from them, Dr. K. Shimomura has successfully used as a blending agent semi-coke produced by his patent process of low-temperature carbonization—a process which is at present being tried out on a semi-industrial scale at the Osaka Gas-Works.

Education in Relation to Industrial Administration.

The announcement in later pages of this issue of what the Polytechnic, Regent Street, London, W., are doing in the way of a course of co-ordinated instruction and training for those intending to qualify for responsible administrative positions in industry, is in agreement with the decision of the Education Committee of the Federation of British Industries that it is now opportune to consider the development of education facilities to cover the subject-matter of administration for industry and commerce. It may be, the Federation say, that even at this date it is impossible to obtain from general experience any common denominator to form the basis for an exact science—that is, a science of administration. It is, however, quite time that some attempt was made to focus the educational requirements of industrial administration. It is for this purpose that a report has been drafted by the Federation, with a view to presenting the summarized opinions as to the main features of such courses and certain over-riding conditions. It is pointed out that a noticeable unanimity is found in the reports of the Balfour Committee on Trade, the Malcolm Committee on Education and Industry, and the Emmott Committee who inquired into the position of technical education in relation to industry, as to the vital necessity of the most intimate contact between education and industry, in order that the fullest value may be obtained from the educational resources of the country in the development of national industry and commerce. It is felt that, for further developments in educational courses to meet industrial requirements, it is essential that the contact between the educational authorities and industries must be established from the first.

PERSONAL.

Mr. ARTHUR W. FARQUHAR, at present Assistant Gas Engineer to the Buckhaven and Leven Gas Commissioners, Leven, Fife, has been appointed Engineer and Manager to the Fraserburgh gas undertaking. This position was advertised in the "JOURNAL" a few weeks ago, and there were 25 applications for the position, the commencing salary for which is £400 per annum.

Dr. E. W. SMITH has been elected Chairman of the Fuel Section of the Society of Chemical Industry, in succession to Prof. Arthur Smithells, F.R.S.

Sir CHARLES JAMES JESSEL, Bart., who was Chairman of the Imperial Continental Gas Association, and who died on July 15, at the age of 68, left estate of the gross value of £183,100, with net personalty £163,367.

OBITUARY.

Mr. W. H. HILL, of whose death, on the 21st ult., we are sorry to learn, was in his 80th year, and had for many years been a Director of Messrs. Mobberley & Perry, Ltd. He gained for himself a large circle of friends in the gas industry.

FORTHCOMING ENGAGEMENTS.

[*Secretaries of Gas and Kindred Organizations are asked to assist in making this diary of events as complete and useful as possible by sending the earliest intimation of all meetings.*]

Sept. 19.—BRITISH COMMERCIAL GAS ASSOCIATION.—Meetings of the Executive and General Committees, at 28, Grosvenor Gardens, S.W.

Oct. 11.—MIDLAND ASSOCIATION OF GAS ENGINEERS AND MANAGERS.—Autumn meeting in Birmingham.

Oct. 18.—EASTERN COUNTIES GAS MANAGERS' ASSOCIATION.—Autumn meeting in London.

Oct. 22-24.—BRITISH COMMERCIAL GAS ASSOCIATION.—Annual Conference at York.

Nov. 22.—SOCIETY OF BRITISH GAS INDUSTRIES.—Autumn general meeting. Hotel Cecil.

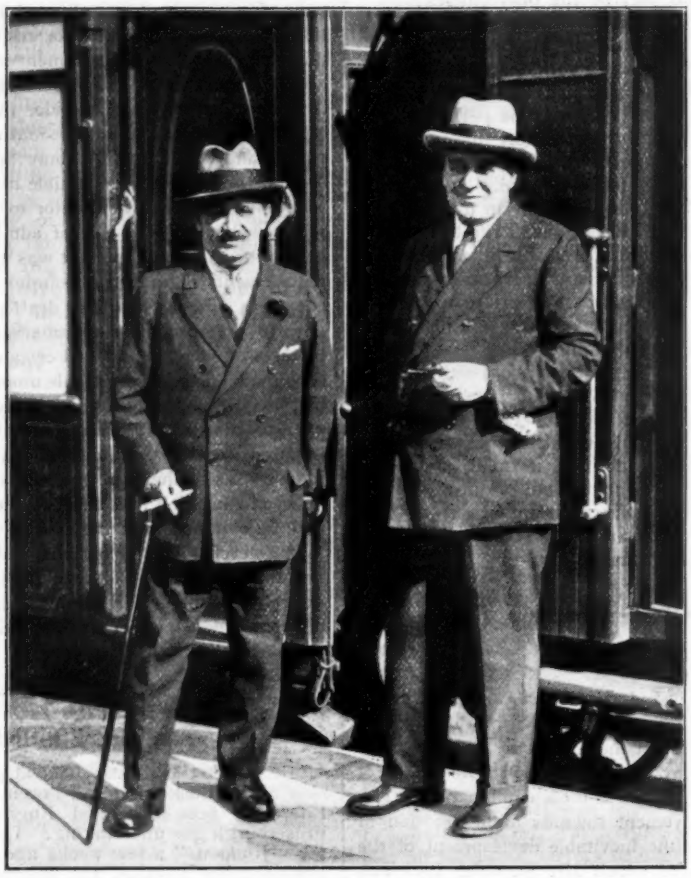
THE INSTITUTION OF GAS ENGINEERS.

All meetings take place in the Council Room at 28, Grosvenor Gardens, unless otherwise stated.

Sept. 11.—Benevolent Fund Committee of Management.

Sept. 18.—Finance and Executive Committees in the morning; Council meeting in the afternoon.

THE ECONOMIC MISSION TO AUSTRALIA.



SIR HUGO HIRST AND SIR ARTHUR DUCKHAM AT VICTORIA STATION.

Many friends were present at Victoria Station on Thursday last week, when the members of the Economic Mission to Australia left London for their tour of the Commonwealth. The party consited of Sir Arthur Duckham, K.C.B., Leader of the Mission, accompanied by Lady Duckham, the Misses Duckham, and Master Richard Duckham; Sir Hugo Hirst, Bart., and Lady Hirst; Mr. Dougal Malcolm, with Lady Evelyn Malcolm and Miss Farquhar; Mr. Norman E. Archer, Secretary of the Mission, accompanied by Mrs. Archer, and Mr. Henderson, Secretary. The main party proceeded overland to Marseilles, where they joined the s.s. "Mooltan" on Friday. Sir Ernest Clark, K.C.B., had already joined the boat at Tilbury the previous week. The members of the Mission expect to be away from this country for about 6 months.

Sir Arthur Duckham, before leaving Allington House, stated that he was very optimistic about the future of the gas industry. "My message," he said, "is that the industry should realize its strength and follow-up its successes."

ON THE ELECTRICAL SIDE.

Accidental Death

Neither gas nor electricity can be made foolproof; and altogether apart from results of carelessness, accidents must be expected to arise from time to time, regrettable as they are when they occur. In spite, however, of the practically universal adoption of one or other—and frequently both—of these forms of heating and lighting, the accidents recorded as resulting in personal injury are few indeed when compared with the terrible toll of the roads—a toll which, be it noted, is not advanced as a reason for doing away with motor-driven vehicles. An accessory manufacturer has been writing to the "Electrical Times" to point out that there must be several million points for electricity in this country, at which it is possible, given certain conditions, to receive a shock; but in spite of this, in 1926 the electrical deaths (lightning excepted) numbered only 44. It is true that the figure he quotes for accidental deaths by gas in the same year (213) is a good deal higher; but it is difficult to say in this case that every death was the result of accident. Sometimes there is an element of doubt; and in such instances, who will blame the coroner, or the jury, for taking the more merciful view?

And Suicide.

The same accessory manufacturer mentions that the Registrar General's figures for 1926 show that apparently 943 deaths occurred in that year through suicide by gas poisoning. This is a sad reflection; but what is to be gained by dwelling upon it? Would one wish to do away with gas because seemingly its employment as a means of self-destruction is "becoming a very popular method?" Is it thought that the distraught persons would have been willing longer to endure a life which they had come to regard as unbearable, had it not been for the proximity of a gas supply? We do not remember to have heard or seen it argued that men should wear beards because razors are sometimes employed for a similar purpose. To place the suicides in the scale against gas would seem to be little more reasonable than it would be to put against electricity the unfortunate beings who from time to time are made to sit in the death chair.

Lek.

A short name for electricity is desired by the contemporary from whose pages we have just quoted; and the suggestion is made that if the word "Lek" should commend itself to the electrical industry, there should be little difficulty in persuading the public to use it. That may be so, though the taste of the public is notoriously fickle. It is true, as is pointed out, that "totalisator" has already been shortened by Press and public to "tote;" that "automobile" has similarly become "car;" and that "kinematograph" is no longer heard in the land. But these were all ugly looking and nasty sounding words, whereas "electricity" possesses quite a pleasant look and sound. Certainly, it has never seemed to us as likely in any way to hinder the progress of the industry. However, if it should be decided by our friends to make the change, we

shall readily conform to their wishes by heading our article "On the Lek Side," and shall hope that the printers will not misinterpret the written word. Never before this had we realized to the full our good fortune, as declared by our contemporary: "The gas industry possesses one enormous advantage over the electrical industry. It sells a commodity of one syllable—to wit, gas." We knew, of course, that there must be something to account for the unceasing advance of our industry; but it had never occurred to us that the secret was to be found in a single syllable. Is this "one enormous advantage over the electrical industry" now to be snatched from us? It would seem so, from the determination of our contemporary. Well, what must be must. If we are to sink, we will at least go down with the flag of "Gas" nailed to the mast. But to think that, after over a century of great public service, our good ship should be threatened by an adversary bearing a banner with a strange device, "Lek!" There is, however, still just a gleam of hope that such a fate may not overtake us; for our contemporary does add, as a sort of afterthought, that "perhaps someone can think of a better word than 'lek.'" We hope so.

Comparing American and English Rates.

In connection with the comparative charges for electricity in typical instances in the United States and in a group of twenty of the largest industrial towns in this country, which was reproduced on p. 445 of last week's issue of the "JOURNAL," it has been pointed out that an error was made with regard to the charges of the Newcastle Electric Supply Company. The rate is 1s. per room summer, and 2s. winter per month, and not per quarter as calculated in the table. The total amount, it is said, should have been £25 10s. 8d.

THE NEW CHAIRMAN OF THE IMPERIAL CONTINENTAL GAS ASSOCIATION.

COLONEL H. LE ROY-LEWIS, C.B., C.M.G., D.S.O.

Colonel Le Roy-Lewis has had a most brilliant and varied life. Apart from the high position which he holds in the City, he is well-known as a scholar, soldier, and diplomat. Educated at Eton and Trinity College, Cambridge, he was called to the Inner Temple in 1883. His Fellowships of the Royal Geographical Society and the Statistical Society are evidence of his subsequent activities in the field of scholarship; and articles from his pen have appeared at various times in the "National Review," the "United Service Magazine," "Baily's," the "National Defence Magazine," "Army Review," &c.

As a soldier he saw much active service during the South African War, finally occupying the post of Deputy Assistant Adjutant General of the Headquarters Staff of the Army. For his services in South Africa he received the D.S.O. and medal with four clasps. In 1912 his services in connection with army organization were rewarded by the conferment of the distinction of Commander of the Bath. Upon the outbreak of war in 1914, he was appointed Military Attaché to the British Embassy in Paris—a post which he filled with great distinction; and he rendered services of inestimable value to the Allies, who honoured him with the following decorations: C.M.G.; Commander, Legion of Honour; Croix de Guerre, with palm; Order of Danilo; Crown of Roumania; White Eagle of Serbia.

In civil life he has filled the offices of High Sheriff for Hampshire, Deputy Lieutenant, and Justice of the Peace. His activities in the City are indicated by his membership of the Board of the following Companies: Antofagasta (Chili and Bolivia) Railway Company; Chilian Northern Railway Company; Continental Union Gas Company (Chairman); Imperial Continental Gas Association (Chairman); Primitiva Gas Company; St. John del Rey Mining Company; and the Trustees Corporation. He is also Chairman of various French and Belgian Companies.

THE INSTITUTION OF GAS ENGINEERS.

COMMITTEES FOR 1928-29.

The following Committees have been appointed for the year 1928-29 :

EXECUTIVE COMMITTEE OF COUNCIL.

President, Vice-Presidents, Hon. Councillors, and Hon. Secretary.

John Terrace, London.
Chas. S. Shapley, Leeds.
Harold E. Copp, Hull.
W. E. Price, West Chobham.
Chas. F. Botley, Hastings.
John Wilkinson, O.B.E., Nottingham.
H. D. Madden, Cardiff.

FINANCE COMMITTEE.

*John Terrace, London.
*Chas. S. Shapley, Leeds.
*Harold E. Copp, Hull.
*W. E. Price, West Chobham.
Chas. F. Botley, Hastings.
Thos. Carmichael, Portsmouth.
W. E. Caton, Oxford.
H. D. Madden, Cardiff.
Harold C. Smith, Tottenham.
W. W. Townsend, Colchester.
J. W. Whimster, Bath.
John Wilkinson, O.B.E., Nottingham.

* *Ex-officio.*

GENERAL RESEARCH COMMITTEE.

Chairman—The President of the Institution, John Terrace, London.

Vice-Chairman : Thos. Hardie, London.

Chas. F. Botley, Hastings.
J. H. Canning, O.B.E., Newport, Mon.
Chas. Carpenter, D.Sc., C.B.E., London.
H. G. Colman, D.Sc., London.
Harold E. Copp, Hull.
E. V. Evans, O.B.E., London.
W. Doig Gibb, O.B.E., London.
Samuel Glover, St. Helens.
Thomas Glover, C.B.E., Norwich.
F. Harding Jones, London.
Stephen Lacey, B.Sc., London.
P. G. G. Moon, Bournemouth.
J. W. Napier, Alloa.
W. E. Price, West Chobham.
T. F. E. Rhead, M.Sc., Birmingham.
W. J. Smith, B.Sc., Bolton.
Arthur Smithells, D.Sc., C.M.G., London.
Samuel Tagg, J.P., Preston.
Henry Woodall, J.P., London.

SUB-COMMITTEE ON GAS APPLIANCES.

Chairman—Thos. Hardie, London.

Chas. F. Botley, Hastings.
Harold E. Copp, Hull.
Thomas Glover, C.B.E., Norwich.
Chas. S. Shapley (co-opted), Leeds.
John W. Cobb, B.Sc., Leeds.
J. B. Cohen, Ph.D., Leeds.
G. R. Thompson, B.Sc., Leeds.

Research Chemist—James W. Wood, M.Sc., Leeds.

SUB-COMMITTEE ON CARBONIZATION.

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Thomas Glover, C.B.E., Norwich.
Samuel Tagg, J.P., Preston.
John W. Cobb, B.Sc., Leeds.
J. B. Cohen, Ph.D., Leeds.
G. R. Thompson, B.Sc., Leeds.
Chas. S. Shapley (co-opted), Leeds.

Research Chemist—Albert Parker, D.Sc., Leeds.

SUB-COMMITTEE ON AMMONIA.

Chairman—Chas. F. Botley, Hastings.

H. E. Bloor, B.Sc., York.
J. W. Cobb, B.Sc., Leeds.
E. V. Evans, O.B.E., London.
H. Hollings, M.Sc., London.
P. G. G. Moon, Bournemouth.
Albert Parker, D.Sc., Leeds.
T. F. E. Rhead, M.Sc., Birmingham.
E. W. Smith, D.Sc., London.
W. W. Townsend, Colchester.
John Wilkinson, O.B.E., Nottingham.

SUB-COMMITTEE ON LIQUOR EFFLUENTS.

Chairman—Chas. F. Botley, Hastings.

T. Lewis Bailey, Ph.D., London.
H. T. Calvert, M.B.E., D.Sc., London.
John W. Cobb, B.Sc., Leeds.
W. E. Price, West Chobham.
P. N. Langford (co-opted), Coventry.
E. W. Smith, D.Sc., London.
Arthur Smithells, D.Sc., C.M.G., London.
John Wilkinson, O.B.E., Nottingham.
Frederick Lee (co-opted), Hinckley.

Research Chemists—Albert Parker, D.Sc. ; A. C. Monkhouse, Ph.D., Leeds.

SUB-COMMITTEE ON CALORIMETERS.

Chairman : P. G. G. Moon, Bournemouth.

J. Ferguson Bell, J.P., Derby.
Thos. Carmichael, Portsmouth.
E. V. Evans, O.B.E., London.
H. H. Gracie, Edinburgh.
Thos. Hardie, London.
H. Hollings, M.Sc., London.
H. D. Madden, Cardiff.
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M. Barrett, Leeds.
F. H. Brooke, Oughtibridge.
G. V. Evers, Stourbridge.
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W. J. Gardner, Meltham, Yorks.
W. T. Gardner, London.
W. L. Jackson, Stamford.
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C. R. F. Threlfall, Stourbridge.
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R. H. Ruthven, Ramsgate.
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GAS EDUCATION COMMITTEE.

No alteration.

NATIONAL GAS COUNCIL OF GREAT BRITAIN AND IRELAND.

Representatives of Institution on the Central Executive Board.

John Terrace, London.
Chas. S. Shapley, Leeds.
H. D. Madden, Cardiff.
W. E. Price, West Chobham.

BRITISH COMMERCIAL GAS ASSOCIATION.

First Vice-President (*ex-officio*), John Terrace, London.
Vice-President nominated by the Institution, Harold E. Copp, Hull.

Compressed Air Used in Cleaning Pipelines.

Compressed air is used in the annual " house cleaning " of California's vast network of oil pipelines; and gangs of men are continually engaged in this work. The equipment utilized, as described in the " Compressed Air Magazine," consists of a special air-operated tapping machine, a pneumatic hammer, and another special air-driven apparatus fitted with brushes. The necessary operating air is furnished by two portable compressors towed by a caterpillar tractor. The tapping machine, which runs along on top of the uncovered pipe, is fitted with a series of air hammers that knock most of the rust and other accumulations from the conduit. Any rust, &c., remaining on the pipe after this machine has passed over it is carefully removed by a man armed with a pneumatic hammer. With this done, the surfaces are thoroughly gone over with the brushes, so as to prepare them for the application of a protective coating of asphaltic material.

Institution of Heating and Ventilating Engineers.—Examinations for admission as Graduates and Associate Members are held at suitable centres in January, May, and September each year; and intending candidates should apply to the Secretary, Mr. H. B. Watt, 12, Russell Square, W.C. 1. Associate members' and graduates' sections are in existence in London and Manchester, and are being formed in other centres, so that members of these grades may have the advantage of frequent meetings.

Exposure as Affecting Slacking of Coal.—Experiments in the laboratory of the Pittsburgh Experimental Station of the United States Bureau of Mines have resulted in the development of a test for comparing the slacking tendencies of coals. Tendency to slack has come to be regarded as indicative of the rank to which a bituminous coal belongs. The more readily a coal slacks, too, the greater is its liability to heat spontaneously, and the poorer generally are its storage qualities. No laboratory test for comparing the slacking tendencies of coals has hitherto been at the disposal of the Bureau of Mines; but that now evolved is simple. It consists in air-drying the coal sample for twenty-four hours, immersing in water for one hour, and then air-drying again. This alternate drying and wetting exhausts and fills the pores of the coal, thereby causing internal strains leading to slacking. The process is, in effect, accelerated weathering; the amount of fines produced for a given coal being a measure of its tendency to slack or weather. The test, although admittedly rough, will serve for purposes of comparison, and it is thought should be of considerable value in the classification of the lower-rank coals.

GREENOCK CORPORATION GAS UNDERTAKING.

A CENTURY OF SERVICE.

On the evening of Monday, Sept. 1, 1828, the Town of Greenock was, for the first time, partially lighted with gas from works which had been erected by the Trustees of the Water Fund; and the centenary of this important event was fittingly celebrated on Saturday last. In connection with the event, an illustrated booklet was prepared, from which the following particulars and photographs have been taken.

Between 1828 and 1869 the original works had been regularly extended to meet the increasing demand for gas, but the time had then come when the site could no longer accommodate additional plant. Accordingly, early in June, 1869, the Gas Committee, under the Chairmanship of Provost James Morton, resolved to recommend the Board to approach the Harbour Trust with a view to ascertaining the price at which they would sell property at Inchgreen. The negotiations were

GEORGE KEILLOR,
Engineer and Manager.

successfully carried out; and under the Greenock Police Improvement and Gas Act, 1871, powers were obtained to proceed with the erection of new gas-works on the island site at Inchgreen. Towards the end of that year, plans, specifications, and estimates of the proposed new works were submitted to the Gas Committee by Mr. S. Stewart, the Manager. In October, 1873, a partial supply of gas was sent out from the new works to augment that from the old ones; and by February, 1874, gas making at the old works had entirely ceased.

Since the completion of the original Inchgreen Gas-Works, the Corporation have, by additions and extensions, always maintained them in a thoroughly up-to-date condition; and to Bailies Taylor and J. Paterson (Conveners), advised by Mr. James MacLeod (then Engineer and Manager), credit is due for the last important scheme of extensions, comprising new purifiers, compressors, high-pressure gas mains, gasholder, vertical retort installation, showrooms, liquor ammonia plant, &c., carried through between the years 1912-1915.

Up to May 15, 1928, the gross capital expenditure on the undertaking had been £414,792, which, after eliminating the original expenditure, shows that £279,348 has been expended on the undertaking on capital account since the works at Inchgreen were finally completed in 1876. The capital value of the undertaking is shown in the accounts at May 15, 1928, as £386,104, against which there are loans outstanding of £121,835, debt having been redeemed to the extent of £264,269. The value of the undertaking as a going concern is considerably more than is represented by the debt outstanding.

Mr. S. Stewart, who in 1865 succeeded Mr. Ritchie in the management of the gas undertaking, retired in March, 1900. He was succeeded by Mr. Chalmers, who died in July, 1900. During the illness of Mr. Chalmers, Mr. Stewart acted as interim Manager, until the appointment of Mr. Ewing, in October, 1900. Mr. Ewing was succeeded by Mr. J. MacLeod in December, 1908; and Mr. George Keillor succeeded Mr. MacLeod in August, 1917.

PRICE OF GAS.

In 1828 gas was sold by meter at 12s. 6d. per 1000 c.ft., and also by contract according to the number of burners in use; while now all gas is sold by meter at:

Prepayment consumers—7·775d. per therm (2s. 7·775d. per 1000 c.ft.

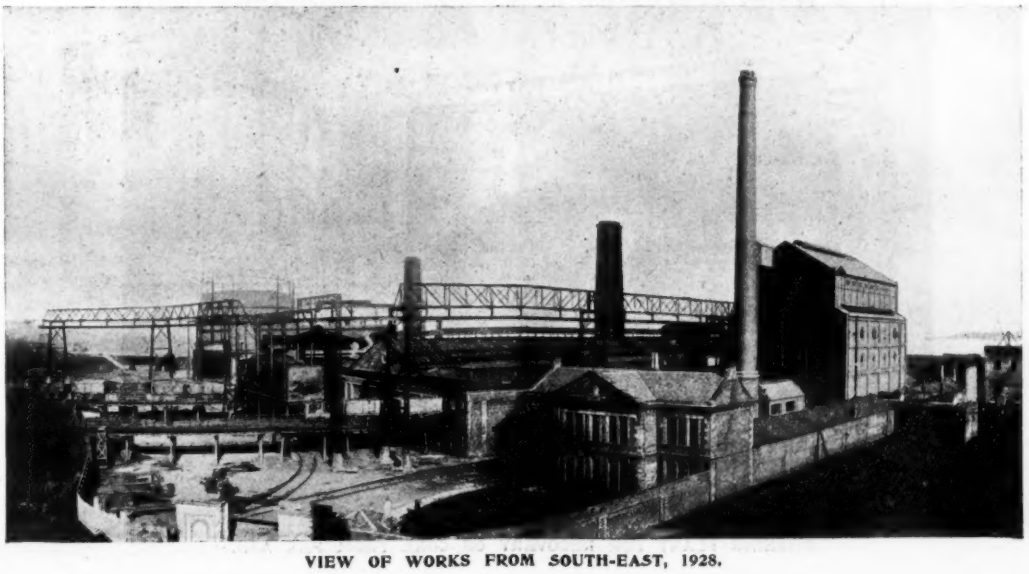
Public street lighting—7·00d. per therm (2s. 4·7d. per 1000 c.ft.), less 10 p.ct. discount.

Sliding-Scale of Charges for Domestic and Industrial Purposes.

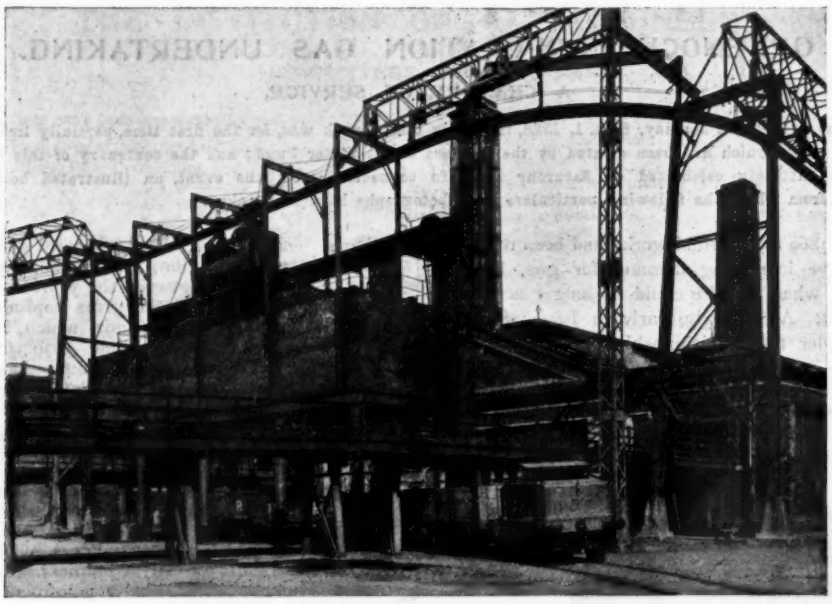
The undernoted rates for domestic and industrial purposes are charged when the consumption per quarter is for quantities:

Therms.	C.Ft.	Price	
		Per Therm	Equivalent per 1000 C.Ft.
		d.	s. d.
Up to 41	10,000	7·25	2 5·725
Over 41 and ,, 82	10,000– 20,000	7·00	2 4·7
,, 82 ,, ,, 205	20,000– 50,000	6·75	2 3·675
,, 205 ,, ,, 410	50,000– 100,000	6·50	2 2·65
,, 410 ,, ,, 1,025	100,000– 250,000	6·25	2 1·625
,, 1,025 ,, ,, 2,050	250,000– 500,000	6·00	2 0·6
,, 2,050 ,, ,, 4,100	500,000–1,000,000	5·50	1 10·55
,, 4,100 ,, ,, 8,200	1,000,000–2,000,000	5·00	1 8·5
,, 8,200 ,, ,, 12,300	2,000,000–3,000,000	4·75	1 7·475
,, 12,300	3,000,000	4·25	1 5·425

These rates apply only to gas consumed in one and the same premises, and when registered through approved meters. Hav-



VIEW OF WORKS FROM SOUTH-EAST, 1928.



COKE SCREENS AND STORAGE HOPPERS.

ing regard to the free use of meters, cookers, maintenance service, &c., the all-in average price of gas is now less than in 1914, and for industrial purposes it is the lowest in Scotland, and among the lowest in England.

General.

Gas is distributed throughout Greenock by 75·19 miles of low-pressure pipes, and 5·63 miles of high-pressure mains—a total of 80·82 miles. The size varies from 3 in. to 24 in. in diameter.

The endeavour of the Gas Department is to provide the best possible service to the consumers, thereby creating goodwill with an attendant increase in sales. During the past year the showroom and offices at West Blackhall Street have been much patronized; and it is interesting to note that no fewer than 16,386 complaints and orders for appliances were notified and attended to in the course of the year. All outdoor employees of the Department are provided with an official badge, numbered, which must be worn when on duty.

The Corporation is an active member of the National Gas Council, the Federation of Gas Employers, and the British Commercial Gas Association. Under the guidance of Sir David Milne-Watson, D.L., LL.D. (Governor of the Gas Light and Coke Company), much good to the gas consuming public and the gas employees generally has resulted from the invaluable administrative and technical work of these Associations in collaboration with statutory gas authorities.

Street Lighting.

During the year 1920, the Public Street Lighting Department was re-organized, and placed under the charge of a separate official. At the same time a new system of lighting and extinguishing the lamps was introduced. The system adopted is known as the "A. & M.," and considerable economies have been effected by its use. All the street and back-court lamps are lighted and extinguished simultaneously by the application of additional pressure to the town's mains at pre-determined times. There are 2082 street and back-court lamps and 5218 stair lights in regular use.

INCHGREEN GAS-WORKS.

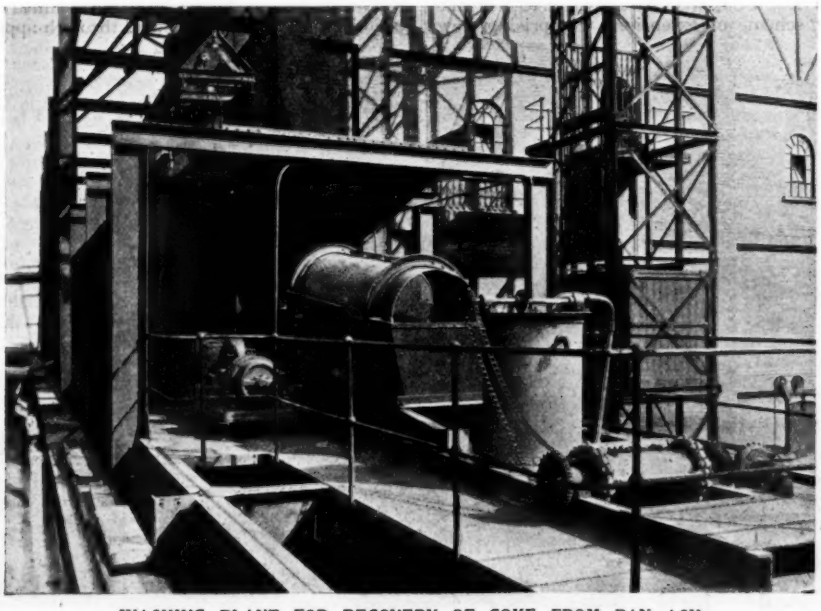
Site.

The works are conveniently situated for both railway and river communication. The area of the site is approximately 8¾ acres. The works were originally designed for a manufacture of 2 million c.ft. of gas per day, but by adopting modern methods of gas manufacture, and re-arranging existing buildings, railway sidings, &c., the site is capable of being utilized for a very much larger output.

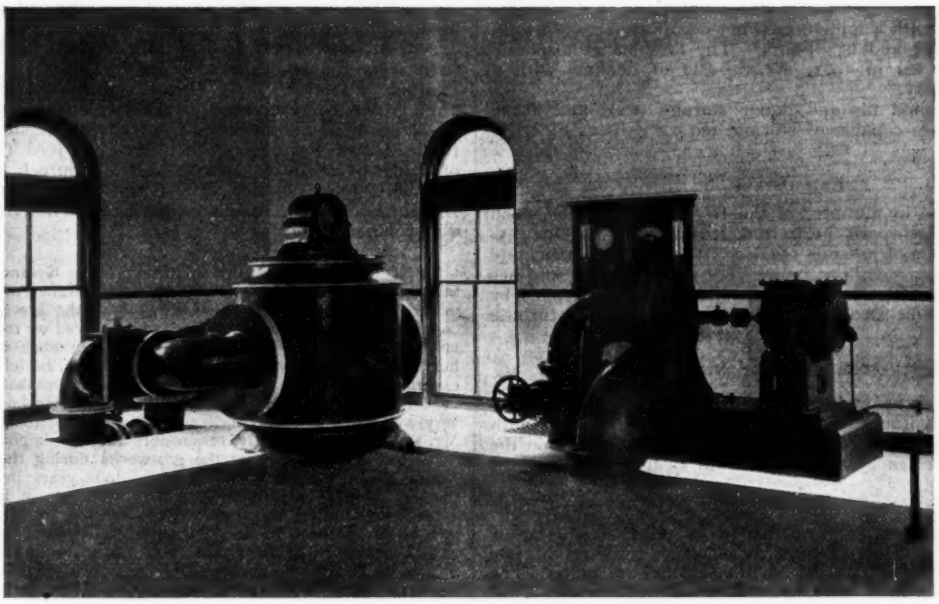
Retort Houses.

In the old retort house, now used as a coal store, there are still 14 horizontal regenerative settings of eights, or 112 retorts, capable of being hand-operated to produce 741,000 to 800,000 c.ft. of gas per day of 24 hours.

In 1913-14, a complete installation of vertical retorts, with mechanical wagon tipper, coal breaker, conveyors, hoist, &c., was erected by the Woodall-Duckham Vertical Retort Company. This installation of modern coal carbonizing plant was brought



WASHING PLANT FOR RECOVERY OF COKE FROM PAN ASH.



STATION METER AND BOOSTER FOR AUTOMATICALLY LIGHTING THE STREET LAMPS.

into use in December, 1914. The plant consists of two parallel benches of eight settings (32 retorts), each setting containing four retorts, producer, regenerator, &c. These settings were completely rebuilt upon latest principles in 1926 and 1927.

With average quality Scotch coal as delivered, the gas producing capacity of the original vertical retort settings was 1,850,000 c.ft. per day; but since being reconstructed, 3,500,000 c.ft. per day is available.

Water Gas Plant.

This plant was erected in 1918, and is capable of producing 500,000 c.ft. of blue water gas per day of 24 hours. Starting from cold, gas can be produced in from six to eight hours. The plant consists of two generators, complete with air blast, gas, and steam valves, a scrubber, and a steam turbine blower. A reinforced concrete coke storage hopper is provided; and the coke is raised to the charging floor level in skips by means of an electric hoist.

Electric Telpherage.

The mono-rail electric telpher machines are complete with hoisting and travelling motors, controller, &c. They have a lifting capacity of 3 tons gross load at 60 ft. per minute, and a travelling speed of from 500 to 600 ft. per minute. These machines convey coke and ashes to the screening and washing plant. The mono-rail telpher track is about 605 ft. long.

Coke Screening Machinery.

The coke screening machinery and coke storage hoppers are so arranged that various sizes of coke and breeze are obtainable. The screened coke is ultimately discharged into railway wagons, carts, &c., to suit the convenience of customers.

Pan ash washing plant was installed in 1924 for the recovery of coke from works ashes.

Electrical Power Plant.

All the electrical energy required on the works is supplied by three Westinghouse direct-coupled shunt-wound protected type D.C. generators, rated at 24 KW., 53 amperes, at 460 volts, running at 240 R.P.M. The gas engines driving the generators are of 42 maximum B.H.P., running at 240 R.P.M., of the British-Westinghouse horizontal single action type. For starting the gas engines, a motor-driven compressed air starter is provided. For distributing the current generated at 460 volts, and transferred to the various motors at 440 volts, a switchboard is provided complete with three generator panels., two feeder panels, volt meters, &c.

Steam Boilers.

There are three Lancashire boilers, 30 ft. long by 8 ft. 6 in. diameter, fitted with Crosthwaite furnaces for burning breeze. A Green's economizer is provided; and the working pressure is 110 lbs. per sq. in. There is also a waste-heat boiler (installed in 1925) capable of generating 7000 lbs. of steam per hour from and at 212° Fahr. from the spent flue gases of the vertical retort settings.

Condensers.

These are of the water tube and atmospheric type. The water-tube condensers (four in number), erected in 1911, are

INTERIOR OF SHOWROOM.

fitted with reversible gas and water connections, and are capable of dealing with 4 million c.ft. of gas a day, between temperatures of 115° and 65° Fahr. The annular atmospheric condensers, erected in 1921, are capable of dealing with 2 million c.ft. a day.

The underground tar and liquor storage wells and above ground tanks are capable of storing 199,500 gallons of crude tar and liquor.

EXHAUSTERS.

These are two in number, of the Bryan-Donkin type, each driven by a slow-speed horizontal steam engine. One exhauster is capable of passing 150,000 c.ft. of gas per hour, and the other 125,000 c.ft. per hour. The speed of the engines and regulation of the vacuum are automatically controlled by means of hydraulic steam regulators and equilibrium throttle valves.

TAR EXTRACTOR AND AMMONIA SCRUBBERS.

The tar extractor and two washer-scrubbers are of well-known types. Each machine is capable of dealing with 3,000,000 ft. of gas per day. The revolving brushes within the scrubbers are driven by small horizontal steam engines.

PURIFIERS.

The purifier house measures 106 ft. by 101 ft. 6 in., and is three floors high. It contains six purifiers—one set of two erected in 1907, and one set of four erected in 1913. The purifiers are each 40 ft. long by 30 ft. wide by 6 ft. deep. The covers are lifted by means of a carriage operated by hydraulic power.

The oxide is fed into the purifiers from an overhead revivifying floor through canvas shoots; the spent material being discharged through valved openings in the bottom of the purifiers and hand-spread on the ground floor to cool and partially revivify. Afterwards the material is passed through an oxide breaker and elevated to the overhead floor.

There is a naphthalene washer capable of dealing with 3 million c.ft. of gas per day.

STATION METER AND GOVERNOR HOUSE.

This house contains two rotary station meters. One is capable of measuring 100,000 c.ft. of gas per hour, and the other 150,000 c.ft. per hour. There are also two station governors. The town is supplied by means of a 24-in. low-pressure trunk main and an 8-in. high-pressure main, with Reynolds governors and controllers. A series of calorimeters is provided to check the heating value of the gas made from hour to hour, and also a continuous pressure recorder to register the pressure in the trunk mains supplying the town. At various parts of the town instruments are fixed to register the pressure and temperature in the mains. From this building the pressure wave for lighting and extinguishing the street lamps is applied by means of a specially designed Donkin "booster," of a capacity of 200,000 c.ft. per hour.

GASHOLDERS.

These are four in number, and the maximum storage capacity is 2,600,000 c.ft. Maximum holder pressure is 7·8 in., and the minimum 3·6 in. A system of boosting makes the total holder capacity available at any desired town pressure.

GAS COMPRESSING MACHINERY.

Owing to the location of the works, the ever-increasing demand for gas, and the inadequacy of the low-pressure trunk mains for distribution purposes, two gas compressors were erected in 1913, and an 8-in. high pressure steel main laid between the Inchgreen Works and the western boundary at Cardwell Bay. Each compressor is capable of delivering 20,000 c.ft. of gas an hour against a pressure of 25 lbs. per sq. in. These machines are driven by National gas engines of 40 B.H.P. In 1920, an additional steam driven compressor capable of delivering 50,000 c.ft. of gas an hour against 20 lbs. pressure was installed. The gas in the high-pressure main is passed into the low-pressure mains at various points through Reynolds governors and district controllers.

AMMONIA RECOVERY PLANT.

All the ammoniacal liquor obtained from the carbonization of the coal and the washing of the gas is distilled in this plant, which comprises stills, pumps, lime mixer, condensers, acid tank, neutralizer, oil and caustic soda washers, and three absorbing tanks. Pure sulphate of ammonia or pure liquor ammonia solution may be made as desired. The plant was re-designed and enlarged in 1927.

LUNCHEON.

In connection with the centenary celebrations, a luncheon was arranged in the Town Hall, Greenock, last Saturday afternoon. Those present included civic dignitaries from neighbouring burghs and cities, influential townspeople, large and industrial consumers of gas, and managers of gas undertakings in different parts of Scotland.

Provost JOHN DRUMMOND, Jun., presided, and on the platform were Sir Hugh Shaw Stewart, Bart., C.B.; the Lord Provost of Glasgow (Sir David Mason, O.B.E.); Bailie A. Dunlop Munro (Convener of the Greenock Gas Committee), Ex-Bailie John Paterson (Ex-Convener of the Gas Committee), Bailie Isabel Kerr, Bailie Robert Crawford (Vice-Convener of the Gas Committee), the Provost of Gourock and Port Glasgow, Mr. John E. Nicol, Mr. Hugh Walker, and Ex-Provost Brown (Greenock). After the toast of "The King" had been duly honoured,

Sir HUGH SHAW STEWART submitted "The Greenock Gas Undertaking," coupled with the name of the Convener of the Gas Committee. He hoped those present had read the brochure which had been prepared for their benefit and which placed on record the history and progress of the gas undertaking in Greenock during the past hundred years of service. If they had done so, he felt sure he would experience no difficulty in asking their warm approval of the work of one of their former Managers—Mr. M'Leod. He knew Mr. M'Leod very well when he (Sir Hugh) was a member of the Gas Committee. Mr. M'Leod was largely responsible for the important extensions which were carried out at the gas-works during the years 1912-15. Round about that period, too—momentous years in the history of the undertaking—the Committee were fortunate in having ex-Bailie John Paterson as Convener. As successor to Mr. M'Leod they secured Mr. George Keillor, the present Manager; and he was glad to acknowledge that they were most fortunate in that appointment. [Applause.] Sound management had characterized the careers of Messrs. M'Leod and Keillor, and Greenock had benefited in a very substantial way. He concluded by extolling the energy and enthusiasm of the present Convener, Bailie A. Dunlop Munro.

In his remarks, Sir Hugh emphasized one noteworthy point when referring to the admirable service rendered by Messrs. James M'Leod and George Keillor in the management. During the years covered by these two gentlemen, a comparison of the gas costs made among the eleven chief towns in Scotland showed that Greenock came out with much the smallest increase in those difficult years—only 25 p.ct. Judging by the increasing demands of gas consumers, and the diminishing costs, they might anticipate a brilliant future for the great undertaking.

Bailie MUNRO, in acknowledging the toast, said the brochure distributed (which had been prepared by Mr. Keillor) relieved him to a considerable extent of the need for going deeply into details. At this centenary luncheon, he thought it was only fitting to pay a tribute to those pioneers who laid the foundations of Greenock's gas undertaking a hundred years ago. At the same time, he felt they ought also to remember that great genius and inventor, William Murdoch. The gas undertaking in Greenock, during its hundred years of service, had proved of inestimable value; and at the moment it must, in fairness, be regarded as one of the town's most valuable assets. Year after year it had contributed in no small way to the reduction of the rates; and he was bound to say that they had been more than fortunate in their Manager and Engineer-in-Chief, Mr. George Keillor, who had demonstrated his fitness and capacity in a variety of ways.

Proceeding, the Gas Convener went on to say that notwithstanding the long spell of dull trade in the staple industries of the town, it was an extraordinary fact that the Gas Department continued to increase its business by leaps and bounds, due to its ability to produce and supply gas not only at pre-war prices, but at prices among the cheapest in the British Isles. This had been made possible by keeping abreast of the times, and by introducing the very latest plant, thereby effecting vast improvements and economy in carbonizing methods in the production of coal gas. It was significant, and a proof of the success of the methods adopted, that, whereas in 1913-14 it required 42,000 tons of coal to produce 418½ million c.ft. of gas, only 31,354 tons were required to produce 656 million c.ft. in 1927-28. Year after year the gas undertaking had contributed handsomely to the reduction in rates; and this had been rendered possible only by having the best of managers in charge of the works. He made bold to say that under the present Manager (Mr. Keillor) the undertaking had been brought to a standard of perfection unsurpassed in Scotland.

The LORD PROVOST OF GLASGOW said he considered it a great honour to be present, and to have the pleasure of proposing "The Town and Trade of Greenock." There were many things in common between Glasgow and Greenock; and he had great admiration for the progressive town of Greenock. With profound interest he had read in the newspapers of the doings of Greenock, its Town Council, its shipbuilders, its sugar refiners, and its gas engineers. The members of the Town Council, he made bold to say, were in public work noted for their disinterestedness, and after all that was the real keynote of the successful municipal service. He rejoiced with them in the fact that they were celebrating the centenary of their gas undertaking, because he had the assurance of those who were experts on the subject that this was one of the finest gas undertakings in the country. For one thing, he had been astonished at the low price at which they could produce gas and supply it to their consumers. It was clear proof of sound management and a splendid undertaking that they were able to furnish gas so cheaply to the community. He hoped that the prosperity of Greenock might long continue.

Provost JOHN DRUMMOND, Jun., briefly replied. The health of the Chairman was pledged at the call of the former Gas Convener, ex-Bailie JOHN PATERSON.

Thereafter the company were driven to the gas-works, where a tour of inspection was carried through.

CONDENSATES FROM GAS IN HIGH-PRESSURE MAINS.

[An investigation by Prof. Dr. K. BUNTE and Dr. A. KAMMÜKER, at the German Gas Institute, Karlsruhe. From "Das Gas- und Wasserfach."]

In considering the supply of gas for long distances under high pressures, and particularly in connection with the Ruhr coke-oven supply scheme, the question is often asked as to what effect the pressures have upon the separation from the gas of condensates, and whether the calorific value of the gas may not suffer considerably from the loss of a quantity of hydrocarbons.

Relevant Laws of Physics.

In order fully to understand the conditions attending the formation of condensates, it is as well to recapitulate certain well-known physical laws which bear on the subject.

(1) *Partial Pressure.*—The pressure which a gas mixture exerts is the total of the partial pressures of its component gases.

(2) The partial pressures which the individual components exert are proportional to the volume in the mixture of the components. For instance, in a mixture of 21 vol. p.ct. O_2 and 79 vol. p.ct. N_2, which exerts a total pressure of 760 mm., the partial pressure of the $O_2 = 0{\cdot}21 \times 760 = 159{\cdot}5$ mm., and of the $N_2 = 0{\cdot}79 \times 760 = 600{\cdot}5$ mm.

(3) A fluid body gives off, to any available space, gaseous molecules (vapour tension). These vapour molecules, also, exert a certain pressure (vapour pressure, saturation pressure).

(4) The vapour pressure of a fluid body is independent of the quantity or nature of any other gas molecules which may be present in addition to its own vapour molecules. The partial pressure of a fluid (or of a solid) body is therefore independent of the total pressure. The vapour tension does not increase in an absolute vacuum, nor does an increased total pressure either diminish or increase the partial pressure of a fluid.

(5) The vapour pressure over a liquid is dependent upon the temperature of the liquid, and, at boiling point, it equals atmospheric pressure (760 mm.).

(6) By the term "vapours," as distinct from "gases," are understood gaseous bodies of which the vapour tension is situated near the saturation point.

(7) (*a*) If a space contains fewer vapour molecules than it is capable of holding at the ruling temperature, the vapour is unsaturated (the partial pressure of the vapour lies below the saturation pressure). (*b*) If, however, a space contains more vapour molecules than correspond with the saturation pressure, then the excess quantity of vapour separates out.

(8) Supersaturation, and, consequently, liquid separation, can, therefore, be due to—

(*a*) A fall in temperature, since a lower vapour pressure goes with a lower temperature (dewpoint).

(*b*) A raising of the pressure. According to (4), the partial pressure of a vapour, and consequently the number of molecules which retain gaseous form in a given space at given temperature, are independent of the total pressure. If, however, this given quantity of gaseous molecules is exceeded—and this happens when a saturated gas is compressed into a smaller space—the surplus, according to (7) (*b*), over the saturation pressure must be deposited in fluid form.

The Influence of Temperature.

In applying these rules to gas in high-pressure mains, the influence of temperature may first be considered. Every temperature has an equivalent vapour tension (partial pressure, partial volume) for any substance in a given volume of space. A table is given in the text showing the vapour pressures between 0° and 30° C. of a few of the most important vapours and gases concerned. In another table these vapour pressures are given as partial pressures at atmospheric and various higher pressures, and the vapour volumes are expressed as litres per cub.m. of space. A third table shows the estimated weights over the molecular volume in the form of oil vapours in grammes per 100 cub.m. at $t°$, when the gas is at equivalent temperatures. Finally, the weights of the substances in grammes per 100 cub.m. are set out, with volumes corrected to 0° C. and 760 mm., not taking into account the fact that actually, with a reduction to 0° C., part of the vapour must separate out.

If in a gas which contains a certain volume (partial volume, partial pressure) of a vapour there is a fall below saturation temperature, or the gas is compressed into a smaller space, then such quantity of the vapour as was excessive to the new equivalent saturation volume must separate out in fluid state. Therefore, the nearer the partial volume or the partial pressure of the constituent vapour is to the saturation volume, the smaller is the temperature fall or pressure increase which will give rise to condensation. For instance, if a gas is saturated with water vapour at the temperature of the holder, which in summer may be (say) 20° C., then, according to the tables, the partial pressure of the water vapour is 17·36 mm. Hg, the partial volume 22·85 litres per cub.m., and the water vapour contents 17·10 grammes per cub.m. at 20°, and 18·35 at 0°. If the gas in the mains becomes cooled to 10° C., the water vapour content can have a partial pressure of only 9·14 mm. Hg, the equivalent partial volume is 12·03 litres, and the weight cannot exceed 9·33 grammes per cub.m. The remainder must of necessity become liquefied. This, of course, applies equally to other constituents of the gas.

There is, however, one complication. A wash-oil, used for benzole or naphthalene extraction, can absorb vapours which, according to the saturation (partial pressure) rule, would not yet be due for condensation, because the benzole or naphthalene tension out of a wash oil is less than the tension of the benzole or naphthalene alone. In the same way other substances, which, for instance, will mix with benzole in the liquid state, can absorb, and so lower the vapour pressure of, benzole, naphthalene, &c. Notable examples are such substances as are commonly used for internal coating of gas mains, which act towards benzole hydrocarbons in much the same way as calcium chloride to water vapour. They absorb these hydrocarbons, and form a solution with them. The coating of the main then becomes liquefied, and is deposited here and there in the form of a viscous mass. Condensates from oils used in the compressors of high-pressure systems behave in the same way. They become vaporized by the heat of the machinery, and are re-deposited later in the mains, where they act in the same way as wash-oils.

The Influence of Pressure.

The more complete the saturation of a gas with any one vapour, the greater is the risk of formation of condensates, not only through a lowering of the temperature, but also through a raising of the pressure. According to Rule (4), the partial pressure of a saturated vapour is only dependent upon the temperature, and is independent of the total pressure. For example, for naphthalene it is 0·021 mm. Hg at 10° C. According to Rule (2), the volume of naphthalene vapour to the total gas volume is as the partial pressure to the total pressure. If, therefore, the total pressure is 760 mm., the volume of naphthalene vapour in 100 cub.m. of gas is $\frac{100 \times 0{\cdot}021}{760} = \frac{2{\cdot}1}{760}$ cub.m. = 2·76 litres in 1 cub.m. As the mol. vol. (22·412 litres at 0° C., 760 mm.) is equal to 128 grammes of naphthalene, there must be in 100 cub.m. of a gas at 10° and 760 mm. total pressure $\frac{128}{22{\cdot}412} \times \frac{273}{273+10} = 15{\cdot}23$ grammes of naphthalene in vapour form.

If now the total pressure of the gas is raised to 30 atmospheres absolute pressure (taking, for convenience, the barometric atmosphere at 760 mm. Hg), then the absolute pressure becomes 30 × 760 mm. Hg. The partial pressure of the naphthalene vapour to the total pressure is then, at 10° C., as 0·021 : 30 × 760; and the volume of naphthalene in vapour form is in the same proportion to the total volume. In a given volume of uncompressed gas, therefore, there can only remain an amount of naphthalene vapour equal in volume and weight to one-thirtieth of the quantity which existed at one atmosphere absolute pressure. This applies equally to other constituents of the gas mixture. Whether, therefore, condensation will take place or not, is dependent upon whether any particular constituent vapour is present in the uncompressed gas in such dilution that, in the relation of the final pressure to the initial pressure, there could be more of it present without the partial pressure (dewpoint at the particular temperature) being reached or exceeded.

(To be concluded.)

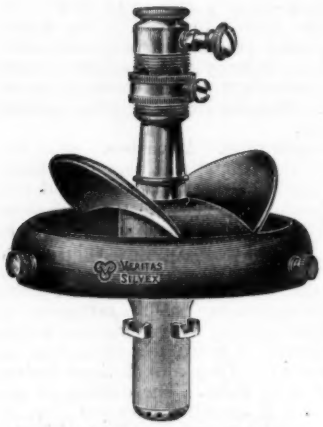
Iron and Steel Institute.—The autumn meeting of the Institute will be held in Bilbao, by kind invitation of the members resident in Bilbao and the neighbouring district. The sessions will take place at the Assembly Hall of the Alfonso XIII. High School, Bilbao, on Tuesday, Sept. 25, at 10 a.m., and on Wednesday, the 26th, at 3.30 p.m. The subsequent arrangements include visits and excursions to the principal iron ore mines and iron and steel manufacturing and engineering establishments in the neighbourhood of Bilbao, as well as excursions to places of historic interest. An extended tour will also be made to Burgos, Madrid, Sagunto, Toledo, Cordova, and Seville, during the days immediately following the meeting.

"VERITAS" BURNERS: SOME NEW FEATURES.

Some features of outstanding merit are to be noted in connection with the new season's "Veritas" burners of Messrs. Falk, Stadelmann, & Co., Ltd., of Veritas House, Farringdon Road, E.C. 1.

The Veritas "Silvex" burner has recently been introduced. The globe gallery is an entirely new design, and is of aluminium. With the exception of the nozzle bush, this burner does not contain any brass. A brilliant non-corrodible alloy in a fine silver colour is used for the bunsen, the gas adjuster, and the air regulator. The burner has a smart and very pleasing appearance, and the price is sufficiently low to allow it to be used for any kind of installation.

The Veritas "Maintenance" bracket burners have been specially constructed for the saving of space, and are most useful in restricted positions, such as bathrooms and landings. They are supplied in two sizes, universal and bijou, in steel bronze and white enamelled; the latter harmonizing with the fittings in modern bathrooms. Although these burners are of great utility so far as space is concerned, there is another outstanding feature. They are now being supplied with flexible tube cock, so that a gas ring or any other portable appliance can be used in conjunction with them.



Recently Introduced—The "Silvex" Burner.

"Veritas Maintenance" Bracket Burner.

"Super Veritas Purelite" Unit.

The Super Veritas "Purelite" burner is eminently suitable for office, shop, or window lighting, where a powerful diffused light is required. It is fitted with extra heavy gauge aluminium gallery, Veritas patent gradual action gas adjuster, and special gas superheater; the latter being of iron and cast in one piece. Three No. 2 size mantles are provided, which will give a light of approximately 300 C.P.

NEW SHOWROOMS OF LIGHTING TRADES LTD.

At this season of the year, more than usual interest centres round the showrooms of firms engaged in the supply of lighting equipment; and the two photographs which we reproduce convey a good idea of the new gas showroom of Messrs. Lighting Trades, Ltd., at Oriel House, Farringdon Street, E.C. 4.

Tastefully decorated and furnished, and occupying a floor space measuring 75 ft. by 25 ft., full advantage has been taken of the ample proportions for the effective display and demonstration of the goods for which the Company are noted.

Exhibited in an extensive show-case is a complete range of mantles manufactured by the Company. In addition to their numerous well-known types of burners are to be seen fittings,

pendants, and glassware in almost endless variety. Many of the new pendants are unique and of ornate design. Of particularly pleasing appearance is a 5-light pendant in oxidized silver, and another for three burners. A rectangular flounced shade on a 2-light burner calls for special notice as being a distinct departure from the popular corona type.

Among the choice collection of decorated glassware a new feature of note is a range of extra wide globes (an example is illustrated) particularly suitable for use with cluster superheater burners. These globes, having the standard flange fitting, measure 9¾ in. by 5¾ in., and carry a bold design in keeping with their size.

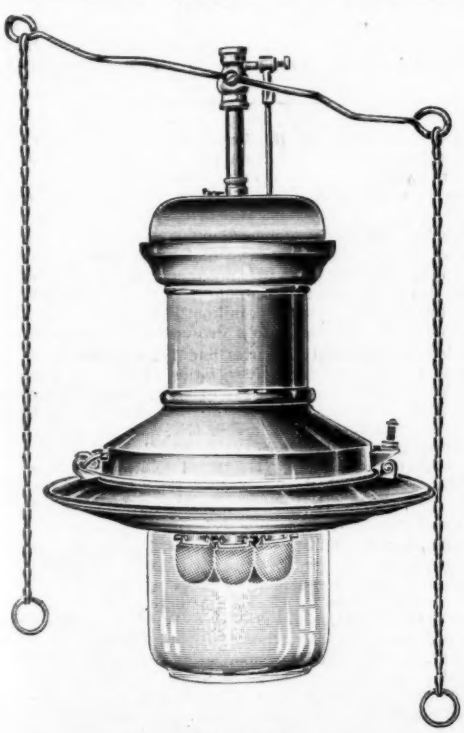
The Company make a special feature of their new patent all magnesia nozzle, an illustrated description of which appeared on p. 455 of last week's "JOURNAL."

Messrs. Lighting Trades have extended their activities in the cooking and heating field, and a good selection of cookers, grillers, fires, &c., is to be seen in the showrooms.

A New Shade for Cluster Superheater Burners.

WELSBACH NEW SEASON'S DISPLAY.

In view of the approach of the lighting season, early preparation has been made by the Welsbach Light Company, Ltd., for meeting the requirements of their customers. Their extensive showrooms at Welsbach House, Gray's Inn Road, London, W.C. 1, contain an immense variety of artistically designed gas lighting appliances capable of satisfying the æsthetic demands of the most fastidious. While it may be said that the Company have an answer to every lighting problem, a few new and attractive lines may be singled out for special mention.



Five-Light "Calshot" Lamp.

The "Eddystone" burner has a china-lined hood, and is fitted with an all-magnesia nozzle and the latest pattern gas adjuster, and heavy brass mixing tube. It is supplied in polished brass, steel or red bronzed, and oxidized copper and silver.

A distinct improvement has been made in the "Calshot" burner, which is now being supplied with a new diffuser nozzle with a perforated refractory disc inside. This not only conduces to silent burning, but dispenses with the corrodible steel gauze hitherto used. The "Calshot" is also obtainable this season as a swan-neck burner. The new burner is fitted with all metal gas and air adjusters, aluminium winged hood, and solid eyelets. It is a swan-neck burner of high class.

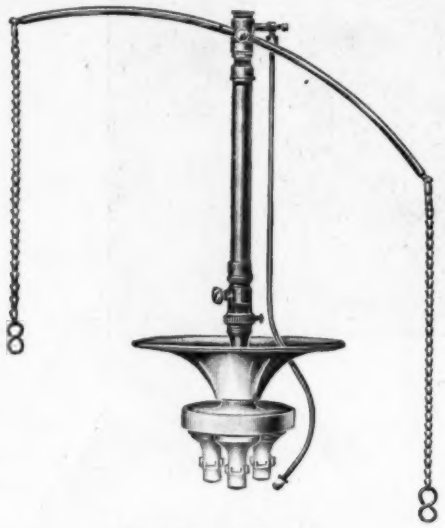
The "Tuskar" burner is now being constructed in a simpler and neater design, which enables it to be supplied at a lower price. This burner is eminently suitable for indoor shop lighting, especially when equipped with diffusing glassware. It takes three medium sized mantles, has a superheated chamber, and gives a brilliant light of approximately 300 candle power.

Another new burner (W. 1093) is a three-light set chiefly designed for semi-indirect bowl fittings. With the ever-increasing demand for this form of gas-lighting, this new burner set should be welcomed.

Among the extensive range of excellent pendants and brackets special mention should be made of a very fine selection of new semi-indirect bowl fittings. The one illustrated is unique in every way, inasmuch as the usual brass band is entirely eliminated, as also is the down-rod. The gas connection from the ceiling is entirely concealed; the gas passing through one of the three ball-jointed suspension rods to the burner, which, in turn, is completely hidden by the bowl. The elimination of the band usually supplied with this type of fitting for supporting the bowl does away with shadows and gives a very neat and artistic appearance to the pendant, at the same

time effecting a considerable reduction in price. These fittings can be obtained for 2, 3, or 5 lights.

As regards lamps, the most important new feature is in connection with the "Calshot" indoor superheater lamp. This is an excellent proposition for lighting factories, restaurants, hotels, and shops—hitherto it has only been made with a three-burner set; but in response to an extensive demand, it will in future be obtainable as a 5-light lamp.



W.1093 Semi-Indirect Set.

The range of new glassware is so extensive and attractive that it is difficult to single out any one particular pattern. Perhaps some of the most noticeable are the beautiful hand painted globes for single light burners. The whole series is very pleasing, and should give rise to an increasing demand.

Semi-indirect bowls are also to be seen in the showrooms in large variety. A bowl which attracted special attention is

Semi-Indirect Bowl Fitting.

made of flake-stone, and has a beautiful floral decoration (not stencilled or sprayed but actually painted on the inside). It is most effective and artistic, and is supplied in three sizes—12 in., 14 in., and 16 in.

The large display of silk shades, bead fringes, and many other accessories of modern gas lighting is also worthy of mention.

Sherborne Gas Company's Good Year.—A gratifying position was revealed at the annual meeting of the Sherborne Gas and Coke Company, Ltd., which was presided over by the Chairman (Mr. T. E. Vincent). The report stated that the revenue account showed a balance of profit on the year's transactions of £2738. The profit and loss account, after paying interest on debentures and loans, showed an available balance of £6617, from which amount the Directors recommended a dividend of 5 p.ct. on the preference shares, and 10 p.ct. on the ordinary shares, both less income-tax. The sale of gas for the year was 59,368,900 c.ft., an increase of 988,300 c.ft. The report was adopted.

PAINTING SERVICE PIPE.

A Fall River Novelty.

Until a few years ago, the service pipes of the Fall River (U.S.A.) Gas Company were either dipped or painted by hand; but the cost of the time involved made it a question whether the added life of the pipe justified the expense of painting it. Writing in "The Blue Flame," Mr. David H. Livingston, the Assistant Superintendent of the Distribution Department of the Company, says that, with a view to decreasing this cost, a machine was designed which both cleans and paints the pipe faster and more thoroughly than can be done by hand.

With this machine, pipes may be painted at a labour cost of only about 1c. per length. Consequent upon the fact that the machine applies a much thicker coat of preservative, the cost of paint is higher than when dipping or hand painting. This thicker coating, however, lasts longer in the ground, and reduces the ultimate cost of the service.

THE MACHINE DESCRIBED.

The machine comprises two sets of circular brushes and a paint spray. The first set consists of three steel-wire foundry brushes; while the second set is made up of four ordinary circular bristle brushes. The paint spray is a ring of pipe with holes bored on the inside, through which paint is sprayed. The whole apparatus is mounted on a steel famework, with a chain and sprocket drive for the brushes, a gear pump to circulate the paint, and a paint tank equipped with a gas burner beneath it to heat the paint supply. The brushes are rotated from a counter-shaft belted to a 1-H.P. motor placed below on the bed of the machine.

As the pipe is fed through the machine, it rests on rollers which take the weight off the bottom brushes, and ensure the easy passage of the pipe through the machine. As the pipe enters the machine, it first passes between the wire foundry brushes, which are revolving at about 800 r.p.m., cleaning the pipe thoroughly of all dirt, rust, and grease. From these brushes, the pipe passes through the spraying ring, where hot paint is sprayed on at high velocity. Surplus paint drops below into the paint supply tank, from which it is circulated again to the spraying ring by the pump.

The paint supply is contained in a galvanized tank open at the top, and extending under the spraying ring. The top of this tank is covered with a removable brass screen. This prevents all dirt brushed from the pipe from getting into the paint supply and clogging the small holes in the spray. Any surplus paint left on the pipe is wiped off as the pipe next passes between the stationary bristle brushes, which distribute the coating evenly over the entire surface. This completes the application of the preservative coating.

SPEED OF OPERATION.

No less than 250 20-ft. lengths of pipe have been put through the machine in an hour. Its capacity is only limited by the speed at which the pipe can be placed in position and pulled through. Two men to feed the pipe into the machine, two men to remove it as it emerges at the other end, and a supervisor to look after the paint supply and watch the heating of the paint comprise the labour necessary to operate the machine.

Reduction in Price at Reading.—The Reading Gas Company have reduced the price of gas from the Midsummer meter readings. The reduction is at the rate of 1d. per therm (4⅛d. per 1000 c.ft.) within the Borough of Reading, making the current price 7⅛d. per therm.

Stockholm Gas-Works Celebration.—The gas-works of the City of Stockholm this year celebrate their seventy-fifth anniversary. Reports published show that, in spite of the widespread use of electricity, the gas production in Stockholm last year increased by 7½ p.ct., and now amounts to about 65 million c.m. annually. The large consumption is ascribed partly to a favourable rate of charge.

Association of Special Libraries and Information Bureaux.—The fifth annual conference of the Association is fixed to take place in New College, Oxford, from Sept. 14 to 17. A varied programme has been arranged—including addresses on "Patent Law Reform, with special reference to the Search for Novelty," by Dr. A. P. Thurston, and "Information on Accident Prevention," by Lt.-Col. J. A. A. Pickard, D.S.O., and Mr. C. G. Ingall (National "Safety First" Association). Full particulars will be sent to anyone interested who applies to Mr. S. S. Bullock, General Secretary, at 26, Bedford Square, London, W.C. 1.

Cheaper Gas for Glasgow.—A proposal to reduce the price of gas in Glasgow by 3d. per 1000 c.ft. is to come before the Corporation at their meeting to-morrow. This is a recommendation of the Glasgow Sub-Committee on Finance, after considering a report submitted by the General Manager (Mr. J. W. McLusky) dealing with the estimated revenue and expenditure of the Gas Department for the ensuing year. Should the recommendation be adopted, the new price of gas will be 3s. 8d. per 1000 c.ft.; and it is calculated that the reduction will represent a saving to the gas consumers of no less than £108,000 during the coming year. It was further decided to revise the terms for special contracts where large quantities of gas are regularly consumed for manufacturing and other purposes.

INSTITUTION OF GAS ENGINEERS' EDUCATION SCHEME.

FIRST LIST OF SUCCESSFUL INTERNAL CANDIDATES.

FROM Mr. Walter Hole (the Organizing Secretary), we have received for publication the following list of successful internal candidates in connection with the 1928 examinations in Gas Engineering and Gas Supply under the Institution's Education Scheme. The list of successful external candidates was published in the "JOURNAL" for July 4. The Examiners are: Gas Engineering.—Messrs. H. D. Madden, M.Inst.C.E., M.I.Mech.E., Cardiff; W. J. Smith, B.Sc., Bolton; H. C. Smith, M.Inst.C.E., Tottenham; R. Robertson, Bristol; J. Terrace, M.Inst.C.E., Sydenham; and J. S. Thorman, London. Gas Supply.—Messrs. S. B. Chandler, A.M.I.Mech.E., Tottenham; H. R. Hems, Birmingham; Stephen Lacey, B.Sc., Assoc.M.Inst.C.E., Westminster; and A. B. Roxburgh, Newcastle-upon-Tyne.

BIRMINGHAM CENTRAL TECHNICAL COLLEGE.

Gas Engineering—Ordinary Grade.

Name.	Class.	Ancillary Subjects Taken.
Underhill, C. H.	1st W.D.	Maths., Inorganic Chemistry, Organic Chemistry
Radnall, E. W.	1st	Maths., Chemistry, Engineering Science.

Gas Engineering—Higher Grade.

Nicholls, F. H.	1st	Mechanical Engineering, Machine Drawing, Applied Mechanics, Gas-Works Analysis.
Rhead, F. A.	1st	Maths., Structural Engineering, Electrical Engineering, Pyrometry.
Ward, D. J.	1st	Applied Mechanics and Heat Engines, Electrical Engineering.
Downing, J.	2nd	Maths., Applied Mechanics, Industrial Chemistry, Electrical Engineering, Engineering Drawing.
Turner, C. R. E.	2nd	Maths., Applied Mechanics, Industrial Chemistry, Electrical Engineering, Engineering Drawing.

Gas Supply—Ordinary Grade.

Hands, L. T. J.	2nd	Maths., Chemistry, Physics, Engineering Science.
Price, J. R.	2nd	Maths., Chemistry, Physics, Engineering Science.

BLACKBURN TECHNICAL COLLEGE.

Gas Engineering—Higher Grade.

Harris, R. W.	2nd	Maths., Engineering Science, Engineering Drawing, Organic Chemistry, Building Construction, Electrical Science.
Powdrill, —	2nd	Building Construction, Electrical Science, Maths., Engineering Science, Engineering Drawing, Organic Chemistry.

BRADFORD TECHNICAL COLLEGE.

Gas Engineering—Ordinary Grade.

Mawson, A	1st	Maths., Inorganic Chemistry, Organic Chemistry, Physical Chemistry, Physics.
Blenkiron, A.	2nd	Inorganic Chemistry, Organic Chemistry.

CARDIFF TECHNICAL COLLEGE.

Gas Engineering—Higher Grade.

Parker, A. C.	2nd	Engineering Science, Engineering Drawing, Building Science, Fuel Technology.

BURNLEY MUNICIPAL COLLEGE.

Gas Engineering—Ordinary Grade.

Pollard, Jack	2nd	Inorganic Chemistry, Organic Chemistry, Physical Chemistry.
Shackleton, H.	2nd	Inorganic Chemistry, Organic Chemistry, Physical Chemistry.

EDINBURGH HERIOT-WATT COLLEGE.

Gas Engineering—Ordinary Grade.

Baird, W. N.	1st W.D.	Maths., Mechanics, Heat Engines, Machine Drawing, Building Construction.
Linley, R. R.	2nd	Maths., Mechanics, Heat Engines, Physics, Chemistry.

Gas Supply—Ordinary Grade.

Ford, J.	1st W.D.	Chemistry, Physics, Mechanics, Heat Engines.
Baird, W. N.	1st	Chemistry, Mechanics, Physics, Heat Engines.
Linley, R. R.	2nd	Maths., Chemistry, Mechanics, Heat Engines, Physics.
Ramage, W.	2nd	Chemistry, Physics, Mechanics, Heat Engines.
Rea, A. C.	2nd	Higher National Diploma in Mechanical Engineering.

GLASGOW ROYAL TECHNICAL COLLEGE.

Gas Supply—Ordinary Grade.

McGown, S.	1st W.D.	Maths., Chemistry, Physics, Dynamics.

HUDDERSFIELD TECHNICAL COLLEGE.

Gas Supply—Ordinary Grade.

Tattersfield, J. B.	2nd	National Certificate in Chemistry.

LIVERPOOL CENTRAL TECHNICAL SCHOOL.

Gas Engineering—Ordinary Grade.

Name.	Class.	Ancillary Subjects Taken.
Gidlow, H. B.	1st	Inorganic Chemistry, Organic Chemistry, Physics, Chemistry of Fuels.
Johnson, B. J.	1st	Maths., Inorganic Chemistry, Organic Chemistry, Physics, Chemistry of Fuels.
Oldham, W.	1st	Inorganic Chemistry, Organic Chemistry, Physics, Chemistry of Fuels.
Grainger, E. H.	2nd	Inorganic Chemistry, Organic Chemistry, Physics, Chemistry of Fuels.
Hardman, A. E.	2nd	Organic Chemistry (Theoretical and Practical), Chemistry of Fuels.
Merryweather, N. H.	2nd	Maths., Chemistry, Physics, Chemistry of Fuels.

Gas Engineering—Higher Grade.

Daniels, J. H.	2nd	Maths., Engineering Science, Engineering Drawing, Mechanics and Heat Engines.

LONDON—WESTMINSTER TECHNICAL INSTITUTE.

Gas Supply—Ordinary Grade.

Lilly, A. R.	1st	Technical Drawing, Engineering Science.
Madge, G. H. W.	1st	Technical Drawing, Engineering Science, Maths.
Price, J. B.	1st	Technical Drawing, Engineering Science, Maths.
Scott, N. G.	1st	Technical Drawing, Engineering Science, Maths.
Toop, A.	1st	Technical Drawing, Engineering Science, Maths.
Wizard, A. J.	1st	Technical Drawing, Engineering Science, Maths.
Castell, A. H.	2nd	Technical Drawing, Engineering Science.
Davies, D. J.	2nd	Technical Drawing, Engineering Science, Maths.
Hall, J. S.	2nd	Technical Drawing, Engineering Science, Maths.
Hilliard, R. M.	2nd	Technical Drawing, Engineering Science, Maths.
Mitchell, J.	2nd	Technical Drawing, Engineering Science, Maths.
Swinhoe, W. R. N.	2nd	Technical Drawing, Engineering Science, Maths.
Tapper, M.	2nd	Technical Drawing, Engineering Science, Maths.
Weichardt, P. G.	2nd	Technical Drawing, Maths.

Gas Supply—Higher Grade.

Baker, S. F.	2nd	Technical Maths., Gas Laboratory.
Craton, H.	2nd	Technical Maths., Gas Laboratory, Mechanics, and Heat Engines.
Osborne, C.	2nd	Technical Maths., Technical Chemistry, Gas Laboratory, Building Drawing.
Phillips, A. G.	2nd	Gas Laboratory, Building Drawing, Maths., Mechanics, and Heat Engines.

REGENT STREET POLYTECHNIC.

Gas Engineering—Ordinary Grade.

Hendy, R. W.	1st	Maths., Inorganic Chemistry, Organic Chemistry, Engineering Science, Chemistry of Gas Manufacture.
Carder, W.	2nd	Maths., Chemistry, Physics, Engineering Science.

Gas Engineering—Higher Grade.

Deas, C.	2nd	Organic Chemistry, Chemistry of Gas Manufacture, Engineering Science.
Ibbett, N. G.	2nd	Organic Chemistry, Chemistry of Gas Manufacture, Engineering Science.
McSweeney, T.	2nd	Chemistry of Gas Manufacture, Engineering Science.
Risby, H.	2nd	Chemistry of Gas Manufacture, Engineering Science, Organic Chemistry.
Sharman, E.	2nd	Chemistry of Gas Manufacture, Engineering Science.
Stonham, B.	2nd	Chemistry of Gas Manufacture, Organic Chemistry, Engineering Science.

MANCHESTER COLLEGE OF TECHNOLOGY.

Gas Engineering—Ordinary Grade.

Windiate, G. H. F.	1st	Maths., Chemistry, Physics.

Gas Engineering—Higher Grade.

Wilcock, G. W.	2nd	Mechanics, Gas Engineering Calculations.
Williams, E.	2nd	Mechanics, Gas Engineering Calculations, Building Construction, Chemistry of Gas Manufacture.

SALFORD ROYAL TECHNICAL COLLEGE.

Gas Engineering—Ordinary Grade.

Name.	Class.	Ancillary Subjects Taken.
Gilden, G.	1st W.D.	Inorganic Chemistry, Organic Chemistry, Physics.

Gas Engineering—Higher Grade.

Pope, J. G.	2nd	Maths., Engineering Science, Mechanical Drawing, Machine Construction and Drawing.
Walsh, J. B.	2nd	Maths., Engineering Science, Mechanical Drawing, Machine Construction and Drawing.

The following candidates sat for Ordinary Grade in Gas Supply as a single subject in order to qualify for the Diploma examination in Gas Engineering:

BATH TECHNICAL COLLEGE.

Ashman, W. L.	1st W.D.
Feltham, H. C.	1st W.D.
Parriss, R.	1st
Wardle, N. H. D.	1st

WESTMINSTER TECHNICAL INSTITUTE.

Name.	Class.
IBBETT, N.	1st
STONHAM, B.	1st

W.D. = With distinction.

LIST OF CENTRES HAVING APPROVED MAJOR COURSES IN GAS SUBJECTS.

To the list published in the "JOURNAL" of Aug. 22, p. 414, should be added

THE RUTHERFORD COLLEGE, NEWCASTLE-UPON-TYNE,

where approved courses in Ordinary Grade and Higher Grade Gas Engineering will be held in the coming session.

It is also hoped that during the session 1928-29 additional approved courses will be held as follows:

Blackburn Technical College .	Gas Supply.
Dublin Technical College . .	Gas Supply and Gas Engineering.
Bath Technical College . . .	Gas Fitting.
Taunton Technical Institute .	Gas Fitting.

LOOSE FIGURING IN CONNECTION WITH THE MANUFACTURE AND DISTRIBUTION OF GAS.

By NORTON H. HUMPHRYS.

Simple methods of calculation, which formerly served every practicable purpose in the preparation of technical, commercial, or financial returns or statistics, have long since been outdistanced by modern requirements. Some are retained more as a matter of custom than for any valid reason. The result is that certain of the standards of comparison commonly in use might with advantage be brought up to date by revision or qualification.

Much complication is due to the indiscriminate use of two standards for weights, measures, pressures, and temperatures, as instanced by the official instructions issued by the Gas Referees, which include cubic feet and litres, and Fahrenheit and Centigrade degrees of temperature; and unfortunately the "conversion factors" are anything but simple. Take the expression of metres in terms of c.ft., or of gallons in litres, as examples. For commercial, also for many technical, purposes, we retain British standards, but the Continental are preferred in the laboratory, and therefore prevail in that class of literature known as "scientific." From such sources they are frequently reproduced in whole or in part, without explanation or qualification, in technical literature. In addition, some gas engineers do not agree with corrections for temperature and pressure, claiming that the whole district is equally concerned, and that correction at the works meters should also extend to the consumers' meters. This view is affected by the magnitude of operations. As for gas measurement per 1000 c.ft. per hour—gas cooled to atmospheric temperature by passage through large check purifier boxes, and the works meter well protected by a substantial building in a sheltered situation—the errors that might be corrected by a basis of standard conditions may not be of serious practical importance. But as much cannot be claimed for other circumstances.

There is some confusion due to the fact that solids and liquids are dealt with in terms of weight, which for practical purposes can be regarded as fixed and invariable, while gases are treated in terms of bulk or volume which may be affected to the extent of nearly 10 p.ct. by the temperature and pressure conditions prevalent at the moment. This particularly applies to calorific values, which really are factors of weight rather than of volume. Even the B.Th.U. per c.ft. is more intimately related to weight than to volume. Dealing with gases in terms of weight is the more direct and simple procedure for some purposes.

So long as methods of carbonization were confined to destructive distillation pure and simple, to straight coal gas containing not less than 95 p.ct. of combustible constituents, and a quality not greatly divergent from 14 standard sperm candles per 5 c.ft., the make per ton was a fair criterion of operating efficiency; always providing that the description and quality of the coal used received fair consideration. A third-rate gas producing material may offer sufficient financial advantage to warrant preference against a first-class gas coal; so a low make per ton is not necessarily associated with inferior skill in working, nor does a high production prove the contrary. But the position is different when a range of 200 B.Th.U. or more and a free use of auxiliary methods are concerned. Primary products of destructive distillation are now commonly supplemented by secondary decomposition, as shown by the destruction of heavy hydrocarbons, gasification of fixed carbon by means of steam, the aid of petroleum, air, or furnace gases—all of which, it should be noted, add to expenses. Steam cannot be supplied gratis, even from a waste-heat boiler. Air costs nothing in the first place; but what about the effects of oxygen and carbon dioxide on the repairs and maintenance accounts?

"MAKES PER TON."

The phenomenal makes per ton now frequently met with are due to assistance of this character rather than to *bona fide* improvements that enable a larger value to be directly extracted from the coal without increase of working cost. A make of 11,000 to 12,000 c.ft. per ton of coal carbonized, of a quality over 600 B.Th.U. per c.ft., was not unknown in the 'nineties, and the yield of therms per ton was not inferior to the best results obtained on the same lines to-day. The make, in terms of c.ft. per ton, should be limited to technical calculations relating to volume, as commercial valuations are better represented by the therm and the declared value.

What is the use of figuring on alleged "makes" of 18,000 c.ft or more per ton, tacitly assumed to be genuine coal gas, when only some 14,000 are saleable under the 1920 Act? The remainder consists of nitrogen, carbon dioxide, and oxygen, all adding to distribution troubles by increasing the specific gravity of the gas. Only the first can claim to be a genuine "inert," the others possessing objectionable corrosive action on all wrought-iron or steel surfaces with which they may come in contact. A large proportion of inerts seems the inseparable companion of the heavy steaming which is now so fashionable. With few exceptions, 20 p.ct. of inerts means 20 p.ct. more invested capital throughout, from the retort to the points of consumption, including condensing, purifying, measuring, storing, and distribution, and is a heavy price to pay for the assumption that a 450 B.Th.U. gas is in many ways more advantageous to all parties concerned than a 550, and for doing work that might be more appropriately done in the vicinity of the burners. Large quantities of over 500 B.Th.U. gas are still being sent out, at prices per therm which will bear comparison with the prices of lower values, and accompanied by maximum dividends, a satisfactory average consumption per consumer, and no increase in complaints. Probably the use of appliances properly adjusted to suit the quality supplied, whether 200 or 600, is the most important consideration. The yield in therms is not a fair valuation in the absence of sufficient information, relating to the quantity of coke, steam, air, and petroleum used, to admit of correct differentiation between direct distillation and supplementary processes; and the result should be set forth not only in actual, but also in saleable, therms. Further, something turns on the safety margin, which varies with the extent of control over the manufacturing process.

Much of the foregoing also applies to percentage analysis of gas, when used as an indication of working efficiency. Five per cent. of heavy hydrocarbons on a make of 12,000 c.ft. per ton represents 600 c.ft., but on 20,000 c.ft. it represents 1000 c.ft.; and 20 p.ct. of inerts may be anything between 2400 and 4000 c.ft. A statement showing the thermal value of each constituent is preferable.

THE ILLUSORY PERCENTAGE.

The illusory percentage is also illustrated by its application to unaccounted-for gas, which is sometimes confused (on the authority of the Board of Trade) with unpaid-for gas—in these days a very different thing. The 1 p.ct. on large makes, or 2 p.ct. on small, that for many years served as representing gas used on works, &c., is a thing of the past. The confusion is chiefly due to the assumption that the principals concerned are fixed quantities; but in fact they include a large number of independent variables. A statement (formerly popular with the chairman at the annual shareholders' meeting) that the unaccounted-for has been reduced from 12 to 10 p.ct., carries a tacit assumption of an important saving; and an engineer anxious to stand well with his board may be excused for appropriating some credit, though he has done nothing in the way of improving matters, the reduction being due to a corresponding increase of output. Twelve p.ct. on 100 millions is the same quantity as 10 p.ct. on 120. The defect is especially evident in comparisons covering a long term of years.

A statement of the average sales per mile of main is subject

to the same defect, because it tacitly assumes that the diameter of pipe and other conditions are fixed quantities; whereas all the conditions concerned, including specific gravity, pressure, maximum and minimum consumption, are subject to variation even in the same district, one year compared with another. One mile of 3 in. pipes, 9½ in. in circumference, will deliver 655 c.ft. of gas per hour under loss of 10-tenths pressure; but if ten times the size, 30 in. diameter, the line will pass 298,000 c.ft. under similar pressure conditions. For increased dimensions of 1 : 10 there is increased delivery of 1 : 455. With equal length sections, the jointing area will vary with the other dimensions, but as the larger pipe must necessarily be supplied in shorter sections, the proportion will be more like 1 : 40. Comparisons can only be on equal basis when all conditions are similar. Hence the recognized advantages of distribution on the large scale as compared with the small.

An important feature is the number of branch connections and length of service pipe up to the meters per mile. The length of service may be anything from ½ mile to over two miles per mile run of main. This point has been entirely overlooked, although the leakage per mile of service, stated in terms of the total quantity delivered, is probably larger than that on the mains. A complete summary of the distribution plant should include everything between the works meter and the consumers' meters.

There is not so much difference in supply pressures, so long as unassisted holder pressures only are concerned, as even the smallest undertakings find 40 or 50 tenths to be required. Opening the governor by-pass valve on Sunday morning and at other times of heavy consumption is a common practice, and not a few have been compelled to call in the assistance of boosting machinery. The theoretical assumption that leakages increase in proportion to the square root of the pressure (and some observers claim a greater ratio) is not borne-out by general experience. Supply pressures have certainly not been reduced; on the contrary they tend to increase, but there is no corresponding rise in the unaccounted-for gas. High pressure has been introduced to an important extent; but the average pressure in the mains and services will be something less than is shown on the governor outlet. Additions or renewals favour increased size, and arrangements for jointing and testing for soundness show good progress. A leak that might pass undetected at 20-tenths pressure may be strongly in evidence under 60-tenths. Under-pressure drilling apparatus and swelled sockets are now used on service connections.

"Free" Gas.

We have heard of municipal owners of gas-works supplying the public lighting in their district free of charge, and this practice fairly represents the usual method adopted by all classes of gas undertakings with regard to unpaid-for gas as used in works, offices, manager's residence, &c. The only distinction between gas sold and gas used is that the latter is sold to the producers. It should by preference be included in sales of gas on one side of the revenue account, and charged to the appropriate heading—manufacture, distribution, or salaries as the case may be—on the other. Free gas should, so far as is possible, be metered, if for no other reason than as a check on waste; and estimation in any form has a natural tendency towards the high side. We have seen statements of working results in which a low unaccounted-for item appears by the side of liberal allowances for free and for public lighting consumption. Attention to the last-named is too frequently a spare-time job in the small gas district. Cleaning the lanterns and maintenance of the burners are left to a utility man who has no special interest or knowledge respecting control of gas consumption. This defect is also specially noticeable where the gas company simply furnish the gas, and all other details are attended to by the local authority. Incorrect impressions as to both cost and efficiency have developed as a consequence. A liberal allowance for contingencies is added to the nominal rate of consumption, and the by-pass jets are reckoned at ½ c.ft. or even 1 c.ft. per hour, whereas they can and ought to be kept down to ¼ c.ft. At nearly every gas-works there is a test meter; and a float carrying six to twelve branches can be easily made-up out of stock fittings. The man in charge of the public lighting should be encouraged to bring in a batch of burners taken at random from different parts of the district (the renewal of mantles affords a convenient opportunity) for testing. The necessity for the highest possible degree of efficiency and economy, also for accurate information as to actual cost, need not be amplified.

Anomalous Coke and Tar Records.

Turning to the coke accounts, a conventional figure of anything between 12 and 14 cwt. per ton of coal carbonized is frequently accepted as representing the make; and the works consumption is taken as the difference between that quantity and the sales. This practice is adhered to without regard to the description of coal used, to extent of steaming, or to internal combustion in the retorts. The usual method of charging coke into a cupola for water gas by means of "buggies" admits of correct estimation; but apart from that, an elaborate record of coke used in the retort house, boiler house, &c., based on unreliable estimates to begin with, is worse than useless. Published results of coal analyses both proximate and ultimate are obtainable, and can be checked by periodical proximate analyses from fair average samples of the delivery. These are also desirable as a means of checking the quality of the coal supply, and may sometimes explain retort-house differences. If a 2·24-lb. retort is also available, so much the better; but tests may be so loosely conducted as to be no improvement on estimates. Reasonable care and skill will soon discover means of proving results to an extent sufficient to render them dependable. Tests on a working scale covering a few days or weeks are not so common as they might be. There are few gas-works at which they cannot be satisfactorily arranged.

Experiences differ as to the percentage of water retained by coke after long exposure to wet weather. There is of course a difference between dry and damp coke; but in the writer's experience this is not very serious unless the material has been designedly drenched, soaked, or submerged. If unusually wet coke is loaded, the water runs freely out of it, and the proportion available for sale in July is not appreciably less than that in November.

The sales of tar, after due correction for stocks, are often taken as an indication of the make, regardless of the fact that at least 5 p.ct. of ammoniacal liquor is also thus included. On the other hand, there is overweight on small quantity sales; and contractors' tanks of a nominal capacity of (say) 8 or 10 tons have a liberal margin for the entrained liquor. The chief difficulty, which is accentuated when vertical retort or C.W.G. plant is used, is correct differentiation between tar and liquor. Frequently a discarded gasholder tank is used, and one of 40 or 50 ft. diameter involves retention of a large quantity in stock—perhaps 3 ft. or more in depth, of half and half that is fit neither for the sulphate house nor for sale. In this connection, it should be mentioned that a gasholder tank that will pass muster as being "sound" for water, because the leakage was not greater than could be compensated for by rain, can be a source of serious loss of both tar and liquor, if taken over without test for soundness and standing constantly about half-full. Separation by settlement is greatly retarded by disturbance even of a trifling character, or by splashing of return liquids from the scrubbers and washers. At times the inlets may be some feet above the surface of the liquor, but by prerefence they should extend below.

Chalked rods, laths, or hot iron bars do not give satisfactory results; a dipping tube as used by contractors for obtaining a full-depth sample from a railway tank is preferable. The entire content is carefully emptied into a tall and narrow measuring vessel that can be soundly sealed, and allowed to stand in a warm and sheltered situation until settlement is complete, when the percentage content of water can be read by inspection. Or after separation by settlement has proceeded to the full extent, the percentage of water retained by the tar can be ascertained by the distillation test.

Under-Staffed?

Managers of small gas-works, with all the cares of the district, prepayment meters, fittings on hire, a sales department, and competition from coal merchants, oil vendors, and electricians, may reasonably claim that they already have their hands full and that many of the foregoing hints simply amount to more brick and no straw. The answer is that in such cases the concerns are not adequately staffed. The modern gas manager tends to become a "jack of all trades;" and experimental tests cannot be satisfactorily carried out at spare moments subjected to continual interruption. If done at all, they are worth doing well.

A House Organ for Antwerp.

The progressive spirit which pervades the Antwerp Undertaking of the "I.C.G.A." is well known to our readers from the frequent references we are able to make to it in these columns; and now we are pleased to welcome a contemporary and to offer to Mr. A. F. P. Hayman, the General Manager, and his colleagues our congratulations on their enterprise. The contemporary is "Le Gazier," house organ of the Compagnie du Gaz d'Anvers, the first number of which was published last month. It is an eight-page broadsheet; and the articles are printed in French and Flemish. It is distributed free among all ranks in the Company's employ. In a foreword, Mr. Hayman says that his conception of the paper was due to a desire to create a new element of cohesion among all those who daily work together to a common end. "I know well," he continues, "how close and sincere are the bonds which unite all members of the personnel, and I am convinced that our journal will consolidate still further the good feeling which is indispensable to the successful conduct of affairs. 'Le Gazier' is to be an intellectual home where all, from the lowest grade to the engineer, will find a field for the ventilation of ideas, a scope for initiative, and a stronghold of their rights."

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Leakage of Gas from Vertical Retorts.

SIR,—Some remarks on leakage of gas from vertical retorts, in your editorial on Mr. J. L. Hyslop's excellent paper, have prompted me to write. You express considerable doubt as to the reasons for greater leakage from vertical retorts than from horizontals. I think this is due to the much greater pressure existing against the retort wall in a vertical retort.

It is an admitted fact that, in horizontals, a plastic layer is formed. Some of the gases evolved will travel via the core to the ascension pipe, and gases evolved from the outside of the plastic layer will take the line of least resistance, travelling via the free space at the top of the retort. If atmospheric pressure is maintained in the ascension pipe, the pressure in the coke zone—*i.e.*, between the plastic layer and the retort wall—will be very little greater. Probably the pressure within the core will be greater than that in the coke zone.

In vertical retorts, the conditions are exactly opposite. No free space being provided, the gas travels to the exit pipe by both routes; the greater portion passing through the coke zone, as is shown by the greater pressure in this region.

Pressures in Vertical Retort.

Level Gauge at Off-Take Ball.

Distance from Top of Brickwork.	Average Pressure against Retort Wall. In. of Water.	Average Pressure in Centre of Core. In. of Water.
Top	0·02	0·02
3 ft.	0·28	0·11
5 ,,	0·21	0·14
7 ,,	0·37	0·28
8 ,,	0·40	0·32

Incidentally these figures prove the existence of a plastic envelope in verticals; otherwise the pressures at both points would be identical.

With such a heavy pressure against the retort walls in verticals, large leakages are not surprising.

Thanking you in anticipation for permitting me to make use of your valuable space.

H. B. KENDRICK.

Gas-Works, Carlisle,
Sept. 3, 1928.

MISCELLANEOUS NEWS.

COMMON SENSE IN ADVERTISING.

By CHARLES W. PERSON, Secretary of the Publicity and Advertising Section of the American Gas Association.

[An Address delivered at the Eastern States Gas Conference.]

When a business is under criticism for wastefulness, it faces a charge of serious nature. Advertising has been so criticized. What has advertising done about it? It has taken the question, "How can the advertising dollar be spent to best advantage?" and, by means of organized research and analytical study, has given an answer that is irrefutable. The basis for that answer is cold, hard fact, backed up by the prudent expenditure of hundreds of millions of dollars and a checking and re-checking of results.

THE RIGHT APPROACH TO ADVERTISING.

In language reduced to terms of an elementary nature, we are told that the primary requisites to a programme of productive advertising are:

1.—Know your market before you advertise. Know it by means of a market analysis, survey, study, or whatever you choose to call it—but know it.
2.—Make up an advertising budget, and stick to it. In other words, appropriate a certain definite amount of money for certain definite objectives, and stick to those objectives.
3.—Split-up the advertising budget into definite amounts for different kinds of advertising—newspaper, direct-mail, outdoor, window display, and so on.

I will not discuss the first or third requisites. They are subjects for individual and specialized treatment. Instead, I shall deal almost exclusively with advertising based on the budget plan.

WHAT BUDGET ADVERTISING IS.

Advertising in accordance with a budget system is not a new kind, or breed, or species of advertising. It is merely advertising based on a pre-determined appropriation, into the making of which has gone much thought and preparation. One purpose of the budget is to bring up the company's advertising objective for analysis at least once a year, fix a scale of effort commensurate with the apparent needs of the business, and then proceed in an orderly way with the execution of the advertising programme.

Budgeted advertising is nothing more or less than applied common sense in advertising. It is business-like advertising. Finally, it is systematized and sustained advertising. It is not likely that a gas company with an advertising programme planned in advance under the budget system would suddenly break out in one day's issue of a newspaper with advertising measles, and then have no message to advertise in that paper for several weeks.

The budget plan enables one to check advertising expenses month by month, or day by day, if desired, and is an incentive to continuity and the judicious use of the various media of advertising. The budget plan will not permit of three or four mailings a month to the same customer lists by the various departments of a gas company, and then have a period of from three to six months during which nothing is sent out.

The economy of an even gradation of advertising power nicely fitted to the needs of the business over a period of time is assured when a gas company at stated intervals, or at least once each year, sets up definite objectives, and then goes after them with a planned, budgeted programme of advertising.

Under such an efficient system, you may be sure that advertising will not rise or fall with the whims or fancies of any one individual. You may be sure that it will not be discontinued suddenly, or stopped temporarily, or played with. It will ride an even course, and at the end of the year will show a nice return on the original investment—all because it has been conducted in accordance with established business principles.

EXPEDIENCY ADVERTISING.

Expediency advertising is the antithesis of budgeted or planned advertising. It was a very popular form of advertising in the gas industry as recently as ten years ago; and it still enjoys a very considerable following. Expediency advertising starts in a hurry, gets all blown up, and then flops. It makes a loud noise when it gets started; but when it dies it makes no more fuss than a "dud." There is no systematic, sustained effort behind expediency advertising. That is why its death rate is so high. Need it be emphasized that the millions poured annually into non-productive advertising are contributed for the most part by the devotees of expediency advertising?

THE GAS INDUSTRY.

Let us look at the gas business, and see if we can discover whether it advertises in accordance with a plan or in accordance with expediency. Surely one cannot say that the industry generally does not operate according to modern standards of accountancy and established business practice. Is it possible that those in executive authority would permit gas companies to spend money for advertising that is not planned, or budgeted, or systematized so that the expenditure can be checked for results from time to time? Surely, the ripe old gas industry, so keenly alert to search-out and stop financial and all other kinds of leaks, cannot be accused in this modern day of an inefficient and wasteful use of the advertising dollar!

Let us look at the facts. A questionnaire was issued recently to thirty gas companies situated in Connecticut, New York, New Jersey, and Pennsylvania. These Companies were chosen at random. The largest serves 52,000 customers; the smallest, 1400 customers. Together the thirty Companies serve 637,000 customers, and the annual gross revenue is $27,574,000. This is a fairly representative slice of the gas industry, according to the law of averages, and it may be said to reflect, at least in a general way, conditions obtaining throughout the industry.

Of the thirty Companies, nineteen operate their advertising under the budget plan. Moreover, sixteen of the nineteen split up the budget into specific uses for the advertising dollar. These Companies are advertising in a common sense way. They know what they are doing.

On the other side of the fence, however, we have eleven out of the thirty Companies who do not budget their advertising—who do not even appropriate a definite amount of money for advertising. No orderly plan or sustained programme worthy of the name—simply money spent for advertising, probably a large part of it for expediency advertising. These eleven Companies serve 262,000 customers, and their annual gross revenue is about $12,000,000. They constitute 37 p.ct. of the Companies reached by the questionnaire. If the survey were extended to cover the entire industry, would it show results of a corresponding nature? The writer believes it would.

Here, then, is revealed an unpleasant picture for the contemplation of those who claim that the general run of gas company advertising is in good health. If an average of about 35 p.ct. of gas company advertising lacks systematic planning and execution, you may be sure that it bears all the earmarks of wastefulness; the

degree of waste depending upon a number of variable factors. Some part of it may be productive; but all of it stands indicted on the charge of breaking the established laws of good advertising practice.

PAY MORE ATTENTION TO ADVERTISING.

There should be no place in the gas industry for expediency advertising or any other kind which runs counter to sound economic principles of modern business administration. There are a number of ways in which to stop it. The subject should be discussed at meetings; it should be featured in articles and editorials in our trade press. And the leaders of our industry, otherwise so scrupulous in ferreting out and eliminating waste by means of modern accounting and budgetary control, should pay more attention to the advertising habits of their companies.

Finally, when it becomes better known in the gas industry that an executive who permits his company to advertise without an appropriation or budget is displaying on behalf of himself and his company a lack of good business judgment, we may expect to see advertising achieve for us some of the things it is doing every day for other industries which adhere to a policy of sound planning and effective budgeting of advertising expenditures.

CORK GAS CONSUMERS' COMPANY.

Satisfactory Progress.

The report for the six months ended June 30, which was submitted at the recent meeting of shareholders, showed that there had been a satisfactory increase in the quantity of gas sold, and consequently it had been possible to reduce considerably the prices charged for gas and coke. After placing £3304 to the credit of depreciation fund, the balance of profit and loss was £7455, out of which the Directors recommended payment of the ordinary dividend at the rate of 8 p.ct. per annum, and a supplementary payment of 2s. per share on account of arrears of previous dividends, which were paid at reduced rates.

In moving the adoption of the report and accounts, the Chairman (Mr. W. B. Harrington) remarked that the trading results of the half-year were very satisfactory, and the business continued to expand in all departments. Reductions made during the past year in the price of gas totalled 2½d. per therm, or 1s. 0½d. per 1000 c.ft. The gas cooking competitions for school children instituted some time ago had been continued, and had proved even more successful than on previous occasions. This year 139 valuable money prizes were awarded, after a searching inquiry into the knowledge and practical efficiency of the candidates in the use of the gas cooker. It was gratifying to find that the experience obtained in preparing for the competition had led to the more effective use of the gas cooker in many households, and was a contributory cause to the continually increasing demand for these indispensable adjuncts to a modern house.

The report was adopted, and the dividend recommended was declared.

ROMFORD GAS AND COKE COMPANY, LTD.

Great Expansion of Business.

The Half-Yearly Meeting of the Company was held on Saturday, Aug. 25, the CHAIRMAN (Mr. Bevous J. Smith) presiding.

The Chairman's review of the position of affairs showed that the Company was making great progress. The sale of gas for the half-year ended June 30 reached 196 million c.ft., as compared with 173 millions in the corresponding half of 1927, being an increase of nearly 23 millions, equal to 13·15 p.ct. The number of consumers added during the six months was 574; and the new appliances disposed of—such as cookers, gas fires, coppers, and geysers—reached the figure of 785.

The Chairman said the Directors were of opinion that there was a great future before the Company, and they were using their best endeavours to ensure that it would become—as he felt confident it would—a gas undertaking of considerable dimensions.

The credit side of the revenue account showed that gas sales amounted to £39,221, and that meter, stove, and fittings rentals had produced £4376, making a total of £43,597. As regarded residual products, lower prices ruled for both coke and tar, and ammoniacal liquor remained a drug on the market, costing the Company a small sum for removal.

FURTHER REDUCTION IN PRICE.

In accordance with the past policy of the Board to lower the price of gas as and when opportunity occurs, notice of a further reduction in the price of gas has been issued, and such reduction will take effect as from the reading of the meters for the Midsummer quarter. The Chairman paid a tribute to all who had worked so assiduously during the half-year to enable such a gratifying result to be placed before the shareholders.

The report and accounts were adopted, and dividends of 7½ p.ct. on the original shares, 6 p.ct. on the "B" shares, and at the standard rates on the respective preference shares, were declared.

CONTRACTS OPEN.

Pipes, &c.

The Gas Committee of the Bradford Corporation invite tenders for special pipes and castings, and puddled iron tubing and fittings. [See advert. on p. 507.]

Stores.

The Gas Committee of the Bradford Corporation invite tenders for various stores. [See advert. on p. 507.]

COAL TRADE REPORTS.

From Our Own Correspondents.

NORTH-EAST COAST.

Another very bad week has been experienced, and the prompt outlook cannot be said to be showing much better prospects. The tonnage position has been no worse; but there is still a shortage of boats below requirements. Northumberland steams are reported to have slightly better prospects for the next week or two; but the Durham position has been so bad that prices have been broken in one or two cases, bunker coals having been especially weak. On the other hand, there has been rather better inquiry for forward positions, though this may be due to the weak prompt position, and the hopes of buyers that they can contract at current prices. Collieries are, however, standing out against this.

Quotations for gas coals are unchanged at 15s. 3d. to 15s. 6d. f.o.b. for Wear Specials, 14s. 9d. for best qualities, and 13s. to 13s. 6d. for others. Brisker demand is anticipated from now onwards, and collieries are firm in their ideas. Durham coking is meeting with poor demand, and, while nominally quoted at 13s. 3d. to 13s. 9d., quite good brands are obtainable at the lower figure. Durham bunker coals are very short of trade. Best qualities have been taking orders at under 14s., though for forward 14s. 3d. is still steadily asked. Ordinary qualities are freely offered down to 13s. Northumberland steams maintain the fixed minimum prices, from 13s. 6d. for best screened sorts downwards.

Gas coke inquiry for forward positions remains good, and 20s. f.o.b. is asked for shipment. For early turns, with definite shipment, this price can be discounted.

YORKSHIRE AND LANCASHIRE.

In view of what are now accomplished advances in the price of domestic and industrial fuels throughout West and South Yorkshire and Lancashire, having been in operation since Saturday last, the householders' demand has shown increased business, and has probably caused hesitating manufacturers to fix up contracts ahead. The continued closing down, even of large collieries, is undoubtedly having the effect of bringing much more before the general public the hitherto not accepted fact that coal at prices prevailing before Sept. 1 could not be mined, and, therefore, the commercial machinery now in being will concentrate in other directions, particularly in respect of gas, electricity, and similar undertakings.

Even to-day, with considerably reduced output, there is over-production in many descriptions of coal. With the approaching darker days, gas coal is moving more freely under contract; but collieries complain that the summer obligations in many cases have not been complied with by the buyers.

The industrial trade shows no sign of improvement; but export is making recovery under the Five-Counties Scheme, Continental buyers in some instances having offered to purchase over periods of two years, and even further, at present rates.

The following are the Humber bunker and export prices, f.o.b. usual shipping ports:

South Yorkshire—Hards, Association, bunkers 19s. 6d., export 15s. to 15s. 6d.; screened gas coal, export 14s. to 15s. 6d.; washed trebles, 14s. 6d. to 15s.; washed doubles, 14s. 3d. to 14s. 6d.; washed singles, 13s. 6d. to 14s.; washed smalls, bunkers 11s. to 14s. 6d.; rough slack, 14s. to 14s. 3d.; and smithy peas, 16s. 6d. to 17s. 6d. export.

West Yorkshire—Hartley's (f.o.b. Goole), bunkers 15s. and export 13s. 3d. to 13s. 9d.; screened gas coal, export 14s.; washed trebles, 14s. 3d. to 15s.; washed doubles, 13s. 9d. to 14s. 3d.; washed singles, 13s. to 13s. 9d.; and washed smalls, bunkers 11s. to 14s. 6d.; unwashed trebles, 14s.; unwashed doubles, 11s. to 11s. 3d.; rough slack, 8s. 9d. to 9s. 3d.; and coking smalls, 8s. 3d. to 9s.

Derbyshire and Nottinghamshire—Top hards, bunkers 19s. 6d. and export 14s. 9d. to 15s. 6d.; cobbles, export 13s. 6d. to 15s.; washed trebles, 14s. 3d. to 15s.; washed doubles, 14s.; washed singles, 13s. 6d.; washed smalls, 11s. to 14s. 6d.; unwashed doubles, 11s. to 12s.; and rough slack, bunkers 14s. and export 9s. to 9s. 6d.

Yorkshire, Derbyshire, and Nottinghamshire—Screened steam coal, bunkers 17s. 6d. to 18s. 6d., and export 12s. to 13s. 3d.; gas coke, export 20s. to 23s.; furnace coke, 19s. to 19s. 6d.; and washed steam, 14s. to 14s. 6d. Goole, and 17s. Hull.

MIDLANDS.

The market position in the Midlands is indeterminate. It cannot be said yet to what extent the new price lists issued by the collieries are enforceable, for the qualities of coal raised are so various, and market conditions differ so widely, that there is great scope for adjusting prices to the actualities of demand. There was no uniformity in the advances on the prices previously ruling. They ranged from 6d. up to 2s. or 2s. 6d. The average was about 1s. Slacks alone were exempted.

Effect has been given to the rise in the case of house coal. With the industrial consumer it is largely a matter of negotiation. While there is a more hopeful feeling with regard to trade, there is no discernible indication of a quickened demand for fuel except in the departments of the market which are swayed by seasonal consumption. In the house coal trade, early requirements were largely provided for before the new lists became operative.

A very sore point with merchants and some of their customers is that collieries claim to put their advances on orders fulfilled from the beginning of the current month, irrespective of the date at which such orders were placed.

In the Warwickshire coalfield an important new departure has been agreed to in principle respecting wage rates. At six collieries where closing down is put forward as the only alternative to a reduction of labour charges, the district minimum of 43 p.ct. on base rates is not to be insisted on. The Wages Board, dealing with the first application for revision (from the Tamworth Colliery Company), fixed the plusage at 32 p.ct.

INDUSTRIAL ADMINISTRATION.

Education for "Management."

It is interesting to note that educational institutions are alive to the necessity of making more effective contact between education and industry, in order that the fullest value may be obtained from the educational resources of the country in the development of national industry and commerce. We understand that for four years past the Polytechnic, Regent Street, have, in an experimental way, provided courses of instruction with this aim in view; and for the coming session a big step forward has been made by the co-ordination and correlation for the first time of the scattered knowledge that has had to do duty in this field of education in the past. Arrangements are being made with the Institute of Industrial Administration to hold examinations under the joint control of the Institute and the Polytechnic.

The course is designed to help those ambitious men and women who have the personal qualities of leadership, but who require in addition a sufficient training in the technique of industrial administration to undertake the management of business organizations which every day increase in size and complexity. For the session beginning in September next, the course will include such subjects as economics, industrial history, industrial psychology, personnel administration and welfare, costing, management, and statistics.

Students of industrial administration may also be interested in a related course of lectures on "The Effect of Government on the Economic Structure of the United Kingdom," to be given by the Right Hon. William Graham, LL.D., M.P., and in a series of lectures by Diplomatic Representatives of South American States on "The Economic Resources of South America." Those who are interested can obtain details from the Director of Education of the Polytechnic.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Sept.* 3.

Values of tar products generally remain unchanged; but little business is reported. Current quotations are:

Pitch, about 50s. per ton, f.o.b.
Creosote, 7⅛d. to 7¼d. per gallon.
Pure benzole, about 1s. 8d. per gallon.
Solvent naphtha, 95/160, 1s. 5d. to 1s. 6d. per gallon.
Pure toluole, 1s. 11d. to 2s. per gallon.
Pyridine bases, about 5s. per gallon.

Tar Products in the Provinces.

Sept. 3.

There is no alteration in the tar products market.

The average prices of gas-works products during the week were: Gas-works tar, 35s. to 40s. Pitch—East Coast, 47s. 6d. to 50s. f.o.b. West Coast—Manchester, 41s. 6d. to 42s. 6d.; Liverpool, 43s. 6d. to 45s.; Clyde, 42s. 6d. to 45s. Toluole, naked, North, 1s. 5d. to 1s. 6d. nominal. Coal-tar crude naphtha, in bulk, North, 9d. to 10d. Solvent naphtha, naked, North, 1s. 1½d. to 1s. 2d. Heavy naphtha, North, 1s. to 1s. 0½d. Creosote, in bulk, North, liquid, 6d. to 6½d.; salty, 5⅞d. to 6½d.; Scotland, 5⅞d. to 6½d. Heavy oils, in bulk, North, 8¼d. to 8½d. Carbolic acid, 60 p.ct., 2s. 2d. to 2s. 2½d. prompt. Naphthalene, £13 to £15; salts, £5 to £5 10s., bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

Benzole Prices.

The following are considered to be the market prices to-day:

	s. d.	s. d.	
Crude benzole . . .	0 10½	to 0 11	per gallon at works
Motor ,, . . .	1 4½	,, 1 5	,, ,, ,,
90 p.ct. ,, . . .	1 7	,, 1 8	,, ,, ,,
Pure ,, . . .	1 10	,, 1 11	,, ,, ,,

European Gas Company's Dividend.—The Directors of the European Gas Company, Ltd., have decided to pay, on Oct. 1, an interim dividend of 4s. per share, free of income-tax.

Birmingham Technical College.—The Birmingham Central Technical College will open for the session on Sept. 24. The prospectus is on the usual comprehensive lines. In the evening, it is to be noted, there is a minor course in gas supply, extending over three years; while the courses for the national certificate in gas engineering and in gas supply extend over five years.

The Barnsley Gas Company are reducing the price of gas by 5d. per 1000 c.ft. Last year the Company reduced the price from 5s. 10d. to 5s. per 1000 c.ft.

The annual sports of the Leamington Gas-Works Cricket Club were held at St. John's Ground, Tachbrook Road, and were attended by a number of interested spectators. The first event was a cricket match between Staff and Showroom Fitters and the Works and District. The match was followed by an interval for tea. Mr. F. A. Jenkins (Assistant Engineer and Sub-Manager) said that unfortunately Mr. R. S. Ramsden (General Manager and Engineer) was unable to be present, but that a letter had been received from him wishing the event every success. They had been pleased to welcome one of the Directors of the Company (Dr. F. H. Haynes) to the field. Mr. Jenkins also thanked Mr. W. G. Kirby (Chairman of the Club) for the excellent musical programme provided. Mrs. S. H. A. Hill presented the prizes to the successful competitors.

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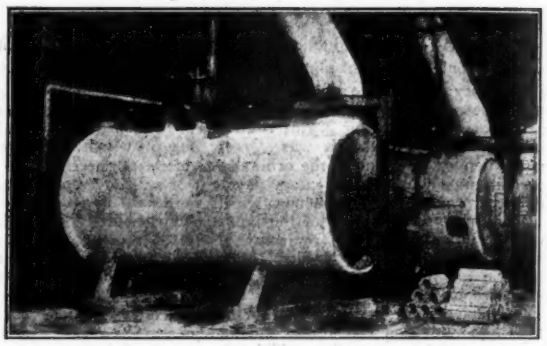

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STOCK MARKET REPORT.

CONDITIONS on the Stock Exchange last week were in every respect similar to the two previous weeks. The strong position disclosed by the Bank Return was a favourable influence, and counteracted the uncertainty of the New York money difficulties. Gilt-edged stocks maintained their high values, and it is now becoming increasingly difficult to obtain an average yield of 5 p.ct. even in the "next best" securities. Colonial corporations and Foreign rail debentures being eagerly sought for. Debentures and preferential stocks in the established industrial concerns and public utility companies are also in great demand.

Gas stocks and shares continued to be very well supported, and there were numerous changes in the quotations. It will be seen from the Table that in many cases the *ex* div. markings were little below the previous *cum* div. figures, thus indicating an improvement in values. All other changes were in an upward direction; and Colombo Ltd. ordinary, Gas Light and Coke 4 p.ct. ordinary, Lea Bridge 5 p.ct. ordinary, South Metropolitan 6 p.ct. irred. preference, South Suburban 5 p.ct. debenture, and Tottenham "B" 3½ p.ct. all benefited.

The following transactions were recorded during the week:

On Monday, Alliance and Dublin 96½, Continental Union 34, European 8⅝, 8 11/16, 8 3/32, Gas Light and Coke 18s. 10½d., 19s., 19s. 1½d., 19s. 2½d., 19s. 3d., 3½ p.ct. 62¾, 4 p.ct. preference 78½, 3 p.ct. debenture 61, 5 p.ct. debenture 100⅜, Imperial Continental 172, 172½, Montevideo 95½, Primitiva 23s. 9d., 24s., 24s. 1½d., 4 p.ct. debenture (1911) 80½, South Metropolitan 106¾, Wandsworth, Wimbledon stock 107. Supplementary prices, Gas Light and Coke 5 p.ct. debenture 100⅜, Metropolitan (of Melbourne) 5½ p.ct. debentures (issued at £100, £50 paid) 50.

On Tuesday, Bombay 23s., Continental Union 33, Gas Light and Coke 19s. 1½d., 19s. 3d., 19s. 3¾d., 19s. 4¼d., 4 p.ct. preference 78⅜, 79½, 3 p.ct. debenture 60, 5 p.ct. debenture 99¾, Imperial Continental 174, Montevideo 96½, Primitiva 23s. 9d., 24s., Sheffield "B" 105⅜, "C" 105⅜, South Metropolitan 3 p.ct. debenture 60. Supplementary prices, Gas Light and Coke 5 p.ct. debenture 100⅜, 101, Hornsey 4 p.ct. debenture 77, Liverpool 5 p.ct. 90⅜, 91½, Metropolitan (of Melbourne) 5½ p.ct. debentures (issued at £100, £50 paid) 50, South Suburban 7 p.ct. debenture 101 5/16, Southend 4 p.ct. debenture 74.

On Wednesday, British 117, European 8⅝, Gas Light and Coke 19s. 1½d., 19s. 2½d., 19s. 3d., 19s. 3¾d., 19s. 4¼d., 19s. 6d., 4 p.ct. preference 79½, 3 p.ct. debenture 61, 5 p.ct. Brentford debenture 104½, 5 p.ct. debenture 100⅜, Imperial Continental 174, Primitiva 23s. 9d., 23s. 10½d., 24s. 0¾d., 24s. 1½d., 24s. 3d., South Metropolitan 105⅜, South Suburban 5 p.ct. 107¼, 107⅜, 5 p.ct. debenture 99⅜. Supplementary prices, Gas Light and Coke 5 p.ct. debenture 100⅜.

On Thursday, Bournemouth "B" 12¼, 12⅜ *ex* div., Commercial 99¼, Continental Union 33, Gas Light and Coke 19s. 3d., 19s. 4½d., 19s. 6d., 19s. 7½d., 19s. 9d., 4 p.ct. preference 78½, 3 p.ct. debenture 60½, 5 p.ct. debenture 101, Primitiva 23s. 10½d., 24s., 24s. 1½d., 24s. 3d., 24s. 4½d., South Metropolitan 106. Supplementary prices, Gas Light and Coke 5 p.ct. debenture 100⅜, 101, Hartlepool 81, Hornsey new 5 p.ct. preference 90, Liverpool 5 p.ct. 90¼, Metropolitan 5½ p.ct. debentures (issued at £100, £50 paid) 50.

On Friday, Bombay 23s. 6d., Colombo 36s., Gas Light and Coke 19s. 4½d., 19s. 6d., 19s. 7½d., 19s. 9d., 3½ p.ct. max. 62¾, 4 p.ct. preference 79, Imperial Continental 173, Newcastle-on-Tyne and Gateshead 3½ p.ct. 16s. 3d., Primitiva 23s. 9d., 24s., 24s. 3d., 24s. 4½d., South Metropolitan 105⅜, 106⅛, 107, 3 p.ct. debenture 60¼, 60½, 61½ p.ct. debenture (1931) 101¼, South Suburban 5 p.ct. debenture 99½, Tottenham "B" 100, Wandsworth "B" 110. Supplementary prices, Gas Light and Coke 5 p.ct. debenture 101, Liverpool 5 p.ct. 90¼, Metropolitan (of Melbourne) 5½ p.ct. debentures (issued at £100, £50 paid) 50.

In Lombard Street the payment for £6,000,000 India Bills caused no discomfort to the market, money being in excellent supply. The rate for both old and new money, after being 3¼ p.ct., dropped gradually to 3¼ p.ct. After the steady rise in the rate since July 20 Treasury Bills eased off to £4 5s. 3·29d. p.ct., or about 4½ p.ct. below the previous week's average. Discount rates were steady.

Of the Foreign Exchanges, Sterling on New York displayed a rising tendency, the "spot" rate closing slightly higher at 4.85 5/16. Italian lire weakened to 92.65½; and the German exchange moved against this country to 20.36¼. Otherwise there was no change. French francs and Belgas remained at 124.27½ and 34.90½ respectively, pesetas closed at 29.21½, and Dutch florins were quoted 12.10½.

There was a fall of 3/16d. in Silver to 26 11/16d. per oz., India and China both selling. Gold showed no change at 84s. 11½d. per oz.

The Bank Rate is 4½ p.ct., to which it was reduced from 5 p.ct. on April 21, 1927. The Banks' deposit rate is 2½ p.ct., and the deposit rates of the discount houses are 2½ p.ct. at call and 2¾ p.ct. at notice.

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf.Yr	Dividends. Last Hf. Yr.	NAME.	Quotations. Aug. 31.	Rise or Fall on Week.	Transactions Lowest and Highest Prices.
£			% p.a.	% p.a.				
171,978	Stk.	Aug 30	5	5	Aldershot 5 p.c. max. C.	72—77*	−2	..
412,992	,,	,,	4	4	Do. 4 p.c. Pref.	68—71*	−1	..
1,551,868	,,	Apl. 12	7	7	Alliance & Dublin Ord.	94—97	..	96½
374,000	,,	July 12	4	4	Do. 4 p.c. Deb.	68—66	..	..
523,654	,,	Aug. 30	7	7	Barnet Ord. 7 p.c.	109—112*	−2	..
300,000	1	Apl. 26	1/7½	1/7½	Bombay, Ltd.	22/—24/-	..	23/-—23/6
170,000	10	Aug. 30	8½	8½	Bournemouth 5 p.c.	12½—13½*	−½	..
300,000	10	,,	7	7	Do. B 7 p.c.	12—12½*	−½	12½—12⅞
375,000	10	,,	6	6	Do. Pref. 6 p.c.	10⅞—11⅝*	−⅛	..
50,000	Stk.	July 12	3	3	Do. 3 p.c. Deb.	56—59	..	..
162,025	,,	,,	4	4	Do. 4 p.c. Deb.	75—78	..	..
357,900	,,	Aug. 30	7½	7½	Brighton & Hove 6 p.c. Con.	114—117*	−2	..
341,880	,,	,,	6⅔	6⅔	Do. 5 p.c. Con.	101—104*	−2	..
1,387,500	,,	July 26	5	5	Bristol 5 p.c. max.	90¼—91¼a	..	..
855,000	,,	Mar. 22	8	7	British Ord.	114—117	..	117
100,000	,,	June 28	7	7	Do. 7 p.c. Pref.	111—114	..	..
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb.	78—76	..	..
200,000	,,	,,	5	5	Do. 5 p.c. Red. Deb.	94—97	..	..
100,000	10	May 24	6	8	Cape Town, Ltd.	7½—8½	..	..
100,000	10	Apl. 26	4½	4½	Do. 4½ p.c. Pref.	6¾—7½	..	..
150,000	Stk.	June 28	4½	4½	Do. 4½ p.c. Deb.	70—75	..	..
636,850	,,	July 26	6	6	Cardiff Con. Ord.	96—99	..	..
287,860	,,	June 28	7½	7½	Do. 7½ p.c. Red. Deb.	100—103	..	..
157,150	,,	Aug. 16	6⅔	5	Chester 5 p.c. Ord.	88—93b	..	..
79,188	1	Apl. 26	†2/-	†2/-	Colombo Ltd. Ord.	34/—36/-	+2/-	36/-
734,495	1	,,	1/4⅜	1/4⅜	Do. 7 p.c. Pref.	20/—22/-	..	..
375,402	1	Apl. 12	1/9⅜	1/9⅜	Colonial Gas Assn. Ld. Ord	23/—25/-	..	..
187,848	1	,,	1/7½	1/7½	Do. 8 p.c. Pref.	21/—23/-	..	..
2,073,280	Stk.	July 26	7	5	Commercial Ord.	97—100	..	99¼
475,000	,,	June 14	3	3	Do 3 p.c. Deb.	57—60	..	..
300,000	,,	Sept. 29	11	11	Continental Union, Ltd.	33—36	..	33—34
200,000	,,	Mar. 8	7	7	Do. 7 p.c. Pref.	92—97	..	..
787,560	,,	Aug. 16	7	7	Croydon sliding scale	107—110*	..	..
408,100	,,	,,	5	5	Do. max. div.	82—85*	..	..
492,270	,,	Aug. 16	10	7	Derby Con.	115—120c*	..	..
55,000	,,	June 28	4	4	Do. Deb.	71—73c	..	..
209,000	,,	Aug. 30	5	5	East Hull Ord. 5 p.c.	75—78*	−1	..
50,000	,,	June 28	5	5	Eastbourne 5 p.c. Deb.	91—96	..	..
1,002,180	10	Mar. 22	14	†6	European, Ltd.	8—9	..	8⅝—8 3/32
19,703,480	Stk.	July 26	5/1/4	5½	Gas Light & Coke 4 p.c. Ord.	19/3—19/9f	+6d.	18/10½—19/9
2,600,000	,,	,,	8½	8½	Do. 8½ p.c. max.	61½—63½	..	62⅜
4,167,020	,,	,,	4	4	Do. 4 p.c. Con. Pref.	77—80	..	78½—79½
5,602,630	,,	June 14	3	3	Do. 3 p.c. Con. Deb.	60—62	..	60—61
181,315	,,	,,	6	6	Do. 6 p.c. Br'tf'd Rd. Db.	103—106	..	104½
1,642,770	,,	,,	5	5	Do. 5 p.c. Red. Deb.	99—101	..	99⅝—101
42,000	,,	—	7½	7½	Do. 7½ p.c. Ilford Deb.	..	.	..
82,500	,,	Aug. 30	6⅔	7	Hastings & St L. 5 p.c. Conv	88—93*	−2	..
258,740	,,	,,	5⅓	5⅓	Do. 3½ p.c. Conv.	71—75*	−1	..
70,000	10	Apl. 26	†10	†10	Hongkong & China, Ltd.	13½—14½	..	..
178,200	Stk.	Aug. 30	5	5½	Hornsey Con. 3½ p.c.	82—84*	−1	..
1,976,000	,,	May 24	10	10	Imperial Continental Cap.	170—175	..	172—174
223,130	,,	Aug. 16	3½	3½	Do. 3½ p.c. Red. Deb.	67—69	..	..
235,242	,,	Aug. 16	7	7½	Lea Bridge 5 p.c. Ord.	98—101	+4	..
2,145,907	,,	Aug. 16	5½	5½	Liverpool 5 p.c. Ord.	90—90½b	..	..
600,000	,,	Mar 22	7	7	Do. 7 p.c. Red. Pref.	103½—105½b	..	..
165,736	,,	Aug. 16	8	9	Maidstone 5 p.c. Cap.	112—117	..	..
63,480	,,	June 14	3	3	Do. 3 p.c. Deb.	52—56	..	..
75,000	5	June 14	18	18	Malta & Mediterranean	5½—6⅜	..	..
641,920	Stk.	May 24	15	17	Montevideo, Ltd.	94½—96½	..	95½—96½
3,061,315	,,	Aug. 16	5	5	Newcastle & Gateshead Con.	16/—16/6df	..	16/3
860,929	,,	,,	4	4	Do. 4 p.c. Pref.	73—74d	..	..
691,705	,,	June 28	3½	3½	Do. 3½ p.c. Deb.	66—67d	..	..
131,780	,,	Aug 30	6/18/0	7/1/0	North Middlesex 6 p.c. Con	96—99*	−2	..
800,000	,,	Apl. 26	9	7	Oriental, Ltd.	115—118	..	..
188,120	,,	June 28	7½	7½	Plym'th & Ston house 5 p.c.	107—112	..	..
414,500	,,	Aug. 30	7½	7½	Portsm'th Con. Stk. 4p.c. Std.	94—102*	−2	..
986,732	,,	,,	5	5	Do. 5 p.c. max	76 79*	−1	..
1,334,464	1	—	—	—	Primitiva Ord.	23/6—24/6	..	23/9—24/4½
244,500	100	June 1	4	4	Do. 4 p.c. Red. Deb.	91—94	..	..
695,000	Stk.	July 26	4	4	Do. 4 p.c. Red. Deb. 1911	76—78	..	80½
416,345	,,	June 28	4	4	Do. 4 p.c. Cons. Deb.	75—77	..	..
160,000	10	Mar. 22	6	6	San Paulo 6 p.c. Pref.	8⅞—8⅞	..	..
370,000	Stk.	Mar. 22	6	6	Sheffield A	104—106e	..	..
419,968	,,	,,	6	6	Do. B	104—106e	..	..
1,047,000	,,	,,	6	6	Do. C	104—106e	..	..
90,000	10	June 14	3	4	South African	4—6	..	..
6,909,895	Stk.	July 26	7½	5	South Met. Ord.	105—107	..	105⅝—107
500,000	,,	,,	6	6	Do. 6 p.c. Irred. Pf.	110—113	+2	..
1,896,445	,,	July 12	3	3	Do. 3 p.c. Deb.	58—61	..	60—60½
784,000	,,	Mar. 8	6½	6½	Do. 6½ p.c. Red. Db.	100—102	..	101½
91,500	,,	Aug. 16	8½	8½	South Shields Con.	107—109d	..	..
1,343,796	,,	July 26	6½	6½	South Suburban Ord. 5 p.c.	105—108	..	107½—107⅝
868,887	,,	June 28	5	5	Do. 5 p.c. Deb.	97 100	+1	99⅜—99⅝
647,740	,,	Aug. 30	5	5	South'mpton Ord. 5 p.c. max	77—79*	−1	..
121,275	,,	June 28	4	4	Do. 4 p.c. Deb.	72—75	..	..
350,000	,,	Aug. 30	7	7	Swansea 7 p.c. Red. Pref.	98—101*	−2	..
200,000	,,	June 28	6½	6½	Do. 6½ p.c. Red. Deb.	99—102	..	..
120,000	,,	July 26	7½	8	Tottenham District A 5 p.c.	116—121	..	..
682,275	,,	,,	6½	6½	Do. B 3½ p.c.	97—100	+2	100
180,000	,,	,,	5½	5½	Do. 5½ p.c. Pref.	96—99	..	..
181,250	,,	June 14	4	4	Do. 4 p.c. Deb.	76—79	..	..
299,094	,,	Aug. 30	6.5/16	8⅞	Uxbridge, Maidenhead, & Wycombe 5 p.c.	89—94*	−1	..
88,834	,,	,,	5	5	Do. 5 p.c. pref.	85—89*	−1	..
80,000	,,	July 12	8½	8½	Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c.	126—129	..	..
355,838	,,	,,	7	7½	Do. B 5½ p.c.	108—113	..	110
431,536	,,	,,	5/19/0	6⅓	Do. C and New	96—101	..	..
351,000	,,	,,	6⅞	6⅞	Do. Wimbledon 5 p.c.	104—109	..	107
98,000	,,	,,	7⅛	7⅛	Do. Epsom 5 p.c.	110—115	..	..
200,000	,,	,,	5	5	Do. 5 p.c. Pref	88—91	..	..
89,416	,,	June 28	3	3	Do. 3 p.c. Deb.	56—59	..	..
264,742	,,	,,	4	4	Do. 4 p.c. Deb.	75—78	..	..

Quotations at:—*a.*—Bristol. *b.*—Liverpool. *c.*—Nottingham. *d.*—Newcastle. *e.*—Sheffield. *f.*—The quotation is per £1 of Stock. * Ex div. † Paid free of income-tax. ‡ For year.

THE "DRI-GAS" PROCESS

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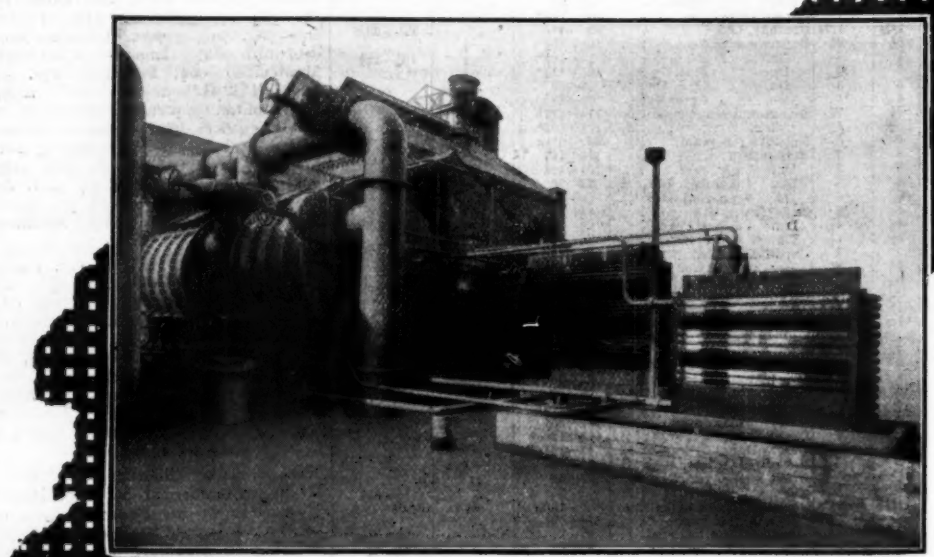

A Combined Patent "Dri-Gas" Plant for the extraction of naphthalene and moisture supplied to the Tunbridge Wells Gas Co. Capacity, 2,000,000 c.ft. of gas per day. J. L. LANGFORD, Esq., *Engineer and Manager.*

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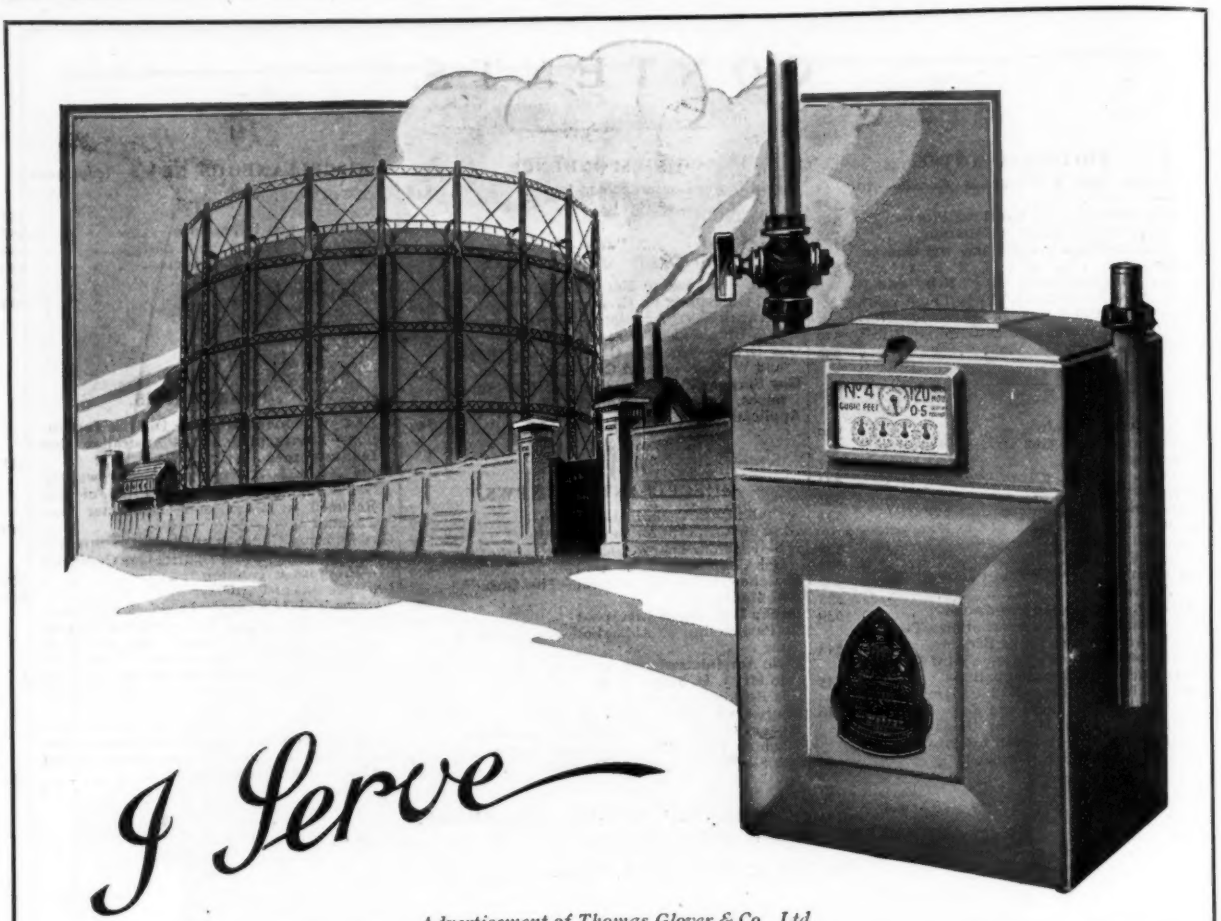

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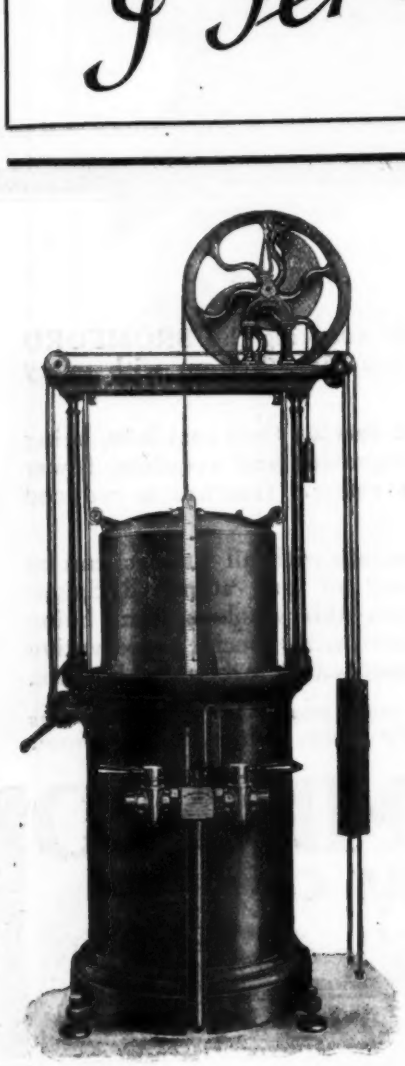

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